4.0 Regulatory Impact Review

The following section addresses the specific requirements of E.O. 12866, to provide adequate information to determine whether an action is "significant," under the Executive Order criteria. The requirements for all regulatory actions, specified in E.O. 12866, are summarized in the following statement from the order:

> In deciding whether and how to regulate, agencies should assess all costs and benefits of available regulatory alternatives, including the alternative of not regulating. Costs and benefits shall be understood to include both quantifiable measures (to the fullest extent that these can be usefully estimated) and qualitative measures of costs and benefits that are difficult to quantify, but nevertheless essential to consider. Further, in choosing among alternative regulatory approaches, agencies should select those approaches that maximize net benefits (including potential economic, environment, public health and safety, and other advantages; distributive impacts; and equity), unless a statute requires another regulatory approach.

The Executive Order requires that the Office of Management and Budget review proposed regulatory programs that are considered to be "significant." A "significant regulatory action" is one that is likely to:

> (1) Have an annual effect on the economy of $100 million or more or adversely affect in a material way the economy, a sector of the economy, productivity, competition, jobs, the environment, public health or safety, or State, local, or tribal governments or communities;
>
> (2) Create a serious inconsistency or otherwise interfere with an action taken or planned by another agency;
>
> (3) Materially alter the budgetary impact of entitlements, grants, user fees, or loan programs or the rights and obligations of recipients thereof; or
>
> (4) Raise novel legal or policy issues arising out of legal mandates, the President's priorities, or the principles set forth in this Executive Order.

4.1 Problem Statement

The recent expansion of the halibut charter industry may make achievement of Magnuson-Stevens Act National Standards more difficult. Of concern is the Council's ability to maintain the stability, economic viability, and diversity of the halibut industry, the quality of the recreational experience, the access of subsistence users, and the socioeconomic well-being of the coastal communities dependent on the halibut resource. Specifically, the Council notes the following areas of concern with respect to the recent growth of halibut charter operations:

1. Pressure by charter operations may be contributing to localized depletion in several areas.
2. The recent growth of charter operations may be contributing to overcrowding of productive grounds and declining harvests for historic sport and subsistence fishermen in some areas.
3. As there is currently no limit on the annual harvest of halibut by charter operations, an open-ended reallocation from the commercial fishery to the charter industry is occurring. This reallocation may increase if the projected growth of the charter industry occurs. The economic and social impact on the commercial fleet of this open-ended reallocation may be substantial and could be magnified by the IFQ program.
4. In some areas, community stability may be affected as traditional sport, subsistence, and commercial fishermen are displaced by charter operators. The uncertainty associated with the

present situation and the conflicts that are occurring between the various user groups may also be impacting community stability.

5. Information is lacking on the socioeconomic composition of the current charter industry. Information is needed that tracks: (1) the effort and harvest of individual charter operations; and (2) changes in business patterns.
6. The need for reliable harvest data will increase as the magnitude of harvest expands in the charter sector.

Currently, there is no limit on the annual harvest of Pacific halibut by recreational fishermen utilizing charter operations, lodges, and outfitters to access this resource off Alaska. Under the status quo, the potential exists, therefore, that an open-ended reallocation from the commercial fishery to the charter industry is occurring. This reallocation may accelerate over time, if the projected growth of the charter industry in Alaska is realized. For a more detailed discussion of the underlying need for the proposed action, see Section 1.0 of the Environmental Assessment (EA).

4.2 Management Objectives of the Action

The Council has proposed a range of alternatives to address the problem of unregulated growth in the charterboat industry, as it pertains to the distribution of Pacific halibut catches among commercial and charterboat fishing sectors, that specifically build on decisions made by the Council in September 1997. As explained in more detail in the introduction to the EA, these regulatory decisions sought to establish guideline harvest levels (GHL) for the charter sector in Areas 2C and 3A, based on 125% of the charter sector's 1995 harvest. The GHLs equated to 12.35% of the combined commercial and charter halibut quota in Area 2C, and 15.57% in Area 3A, based on available data in 1997. Revised estimates indicate the GHLs equate to 12.34% and 15.54%, respectively, based on more recent information (see Section 1.0of the EA).

The Council's objective is to seek an equitable balance between the competing needs of each sector by establishing a GHL which simultaneously recognizes the economic importance and contribution to the region of the charterboat sector, and yet safe guards the integrity and stability of the highly valued directed commercial halibut fishery off Alaska. (See Section 1.1 Purpose and Need for the Action for an in-depth treatment of this topic).

4.3 Alternatives Considered

The suite of GHL alternatives under consideration was developed over an extended period, with input from a wide range of sources (see Section 1.2 for a detailed discussion of this process and development). Initially, this process resulted in a suite of three alternatives, in April 1998. A second round of meetings resulted in a suite of five alternatives, with a number of options and sub-options in April 1999.

Subsequently, the Council further modified, and then adopted the restructured alternatives during review in December 1999, which are the basis for this analysis. The restructured alternatives were requested and supported by the SSC. Indeed, the new alternatives facilitate a clear presentation and better understanding of the environmental and economic analyses. After the Council selected its preferred alternative in February 2000, NMFS identified that implementing the recommended management measures through the framework process resulted in difficulties with meeting APA requirements. It recommended a fourth alternative that would publish the Area 2C and 3A GHLs and a formula for reducing them if the halibut resource declined through notification in the *Federal Register*. Further, NMFS would notify the public of the GHL after the IPHC determines the GHL and would send a letter to the Council and publish a notice in the *Federal Register* if a GHL was reached.

The very extensive set of alternatives, issues and options are presented, in considerable detail, both in the EA and later, in association with the economic analysis, in Sections 4.5 and 4.6, below. They are not repeated here because of their complexity and detail, but are formally included (as required) in the RIR, by reference (see Section 1.2).

4.4 Economic Tools and Analytical Framework

Economic considerations for allocating a resource among competing sectors center around the notion of economic efficiency, which is analogous to the idea of "maximum net benefits". An efficient allocation occurs when the combination of net benefits to consumers and producers in each sector is greatest. This combination is the sum of net benefits to the primary stakeholders in each user group: consumers of commercially caught halibut, commercial fishermen, sport anglers, and charter operators. Cost-benefit analysis (CBA) is conducted to enumerate the net benefit effects of policy changes on primary stakeholders. Though policy changes also affect secondary markets, such as the processing sector, these effects are not generally treated separately in CBAs because they are captured under a demand analysis for the primary market, provided secondary markets are not distorted (Boardman et al. 1996). Barring distortions in secondary markets, changes at this level are negligible in the net benefit context because they are likely offset by changes elsewhere in the economy (Johnston and Sutinen 1999).

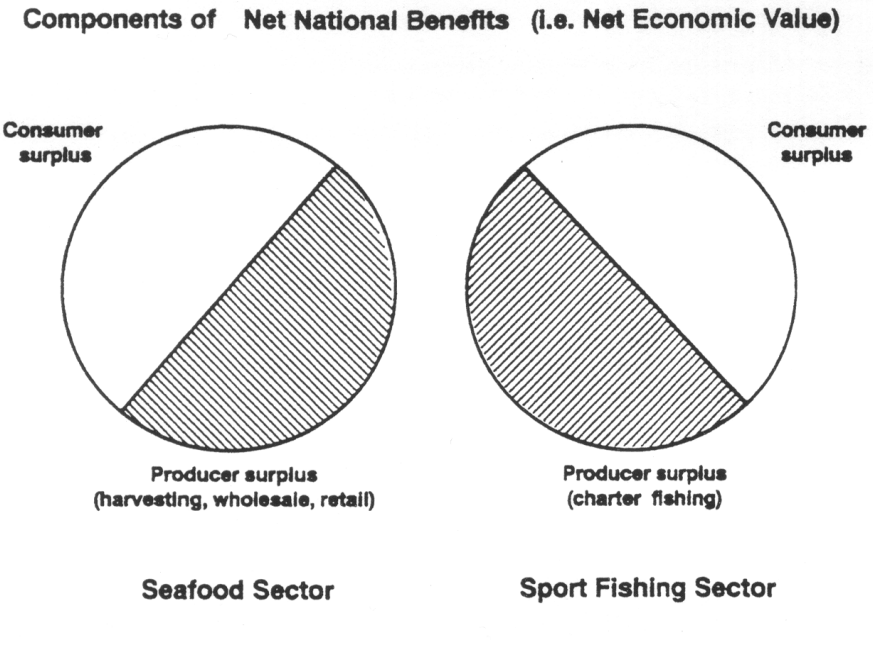
Consumers of seafood determine the value of commercial fish through their willingness to pay. Total net benefits to consumers are measured as the difference between "willing to pay", and what the consumer actually is required to pay (the market price) to consume seafood. The net benefits to commercial fishers is the difference between what they receive for supplying fish (ex-vessel revenues) and all costs associated with harvesting the resource, inclusive of opportunity cost. Opportunity cost represents the value of the next best business alternative that a commercial operator could have engaged in with his or her investment. Net benefits to commercial harvesters, and producers in general, are referred to as producer surplus.

Consumer surplus in the recreational sector exists regardless of whether there is a market for the recreational activity, since it is the difference between what anglers are willing to pay to sportfish and the costs incurred to fish. In the case of charterboat fishing, there is a market for guided trips, and the difference between what a guided angler would be willing to pay and what she does pay (the charter price) is the net benefit, or consumer surplus to anglers. The net benefit, or producer surplus, to charter operators is the difference between their total revenues and their costs, including opportunity cost.

The summed total of consumer and producer surpluses in both the commercial and recreational sector represent the total net benefit society derives from the resource (although note that in this case there are other uses for halibut that fall outside this particular allocation, such as unguided sportfishing, subsistence, etc., and these also contribute to total net benefits). Through a number of modeling approaches, cost-benefit analysis attempts to first identify current levels of net benefits to each market, and then to predict how net benefits would change as portions of the resource are allocated from one sector to the other. In assessing only net *national* benefits, it should be noted that some benefits are excluded in a CBA. For example, the consumer surpluses of foreigners who come to Alaska to sportfish or the benefits enjoyed by the consumers of exported commercial halibut would not be a part of the net national benefit calculation.

It can be the case that the allocation that produces net national benefits is one that greatly favors one sector over the other, or that is substantially different from the starting point. As explained by Edwards (1990), so long as net national benefits increase, efficiency is gained even if it means a substantial loss of economic surplus to one of the sectors. The "compensation test for judging whether efficiency is increased is whether 'winners' of economic value could compensate 'losers' and still come out ahead" (Edwards 1990). In the second of the two models below, allocation of the resource to Sector A results in a loss of efficiency, while

allocation to sector B results in a gain of efficiency. This implies that the combined size of the pie is what matters in the determination of efficiency, rather than the relative sizes of the shares for each sector, which is why the individual "slices" of consumer and producer surpluses for each sector are not shown in the either of the allocation changes represented by the left and right-most pies of the second model below.



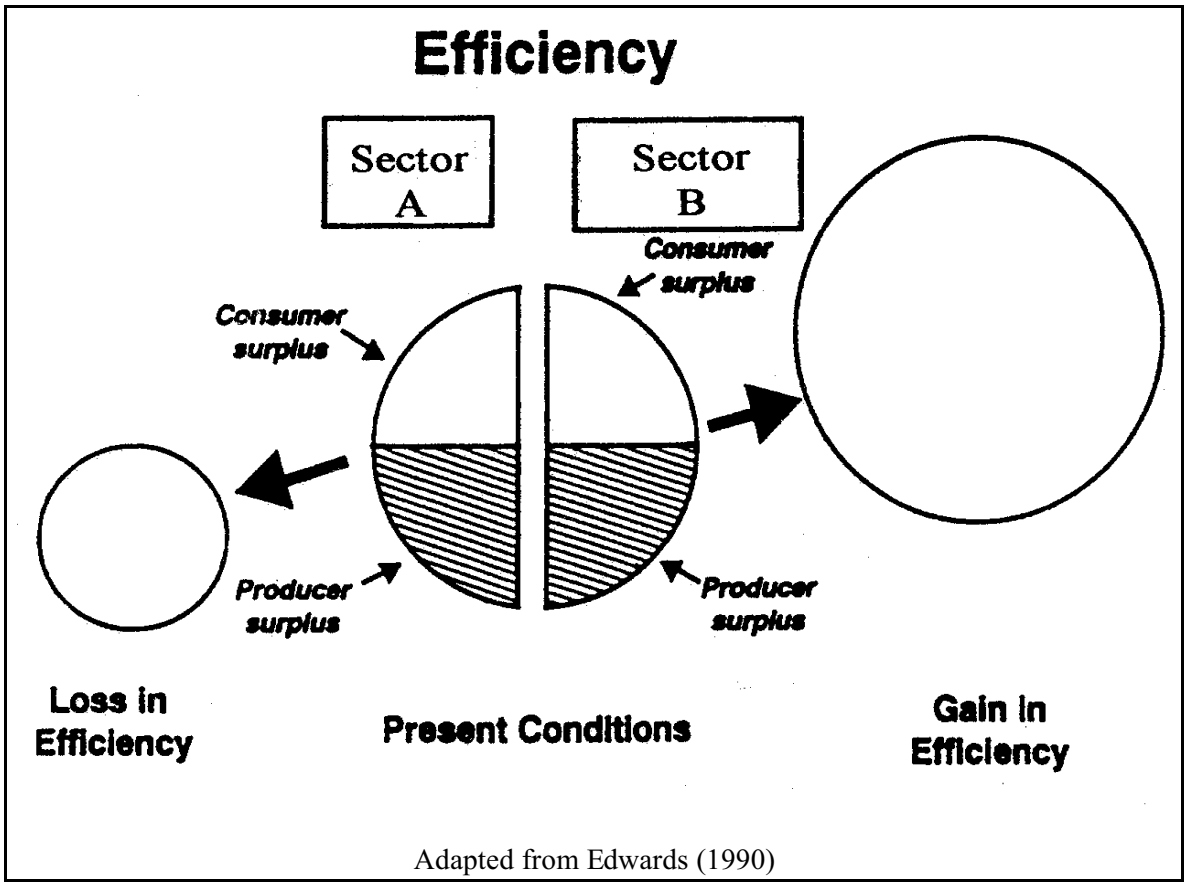
Adapted from Edwards (1990)

Economic "efficiency "does not take "equity" into account (i.e., differential weighting of the interests or utility of one group, as compared to others), nor does it necessarily consider the effects of regional impacts associated with changes in allocation. Both the commercial and sport fisheries contribute to regional economies. Producers in both sectors purchase inputs such as labor, fuel, vessels and vessel maintenance services, financial services, etc. They both pay taxes that contribute to the well being of communities, and support linked industries such as processors, marine equipment suppliers, and fuel piers.

As consumers of sport fishing services, guided anglers also spend monies that contribute to the economic well being of communities that provide charters. National Standard 5 of the Magnuson-Stevens Act mandates that economic efficiency be considered in the management process, but that it should not be the sole purpose of the allocation process. Identification of the downstream monetary impacts is helpful supplemental information in revealing the distributional effects of a policy change among the various industry sectors of a local or regional economy, quite apart from the net benefit implications, and this is the subject of economic impact analysis.

Economic impact analysis (EIA) provides a snapshot of the economic interdependencies of various industries in a regional economy, and therefore allows analysts to model the downstream effects of demand changes for commodities or services. Since opportunity costs and willingness to pay do not enter into the impact assessment framework, the results of an EIA should not be confused with statements of value. It should be noted, however, that the results that yield the greatest value under a CBA may, at times, imply very disproportional allocations among stakeholders. Because notions of fairness and equity do not enter into the CBA framework, EIAs are useful tools for tracking and identifying the impacts, in revenue and employment terms, of alternative policies among the various players in an economy. For a more detailed discussion on the differences and appropriate uses of CBAs and EIAs, see Edwards (1990), Johnston and Sutinen (1999), or Steinback (1999).

Data limitations and time constraints prohibit the development of a full complement of models to estimate net benefit and impact assessments of the halibut charter and commercial fisheries. A number of past studies and ongoing projects are referenced in this chapter and developed to characterize the economics of these fisheries; however, it was not possible to present more than a fragmented economic view on some aspects of present levels of economic benefits and impacts. The Scientific and Statistical Committee reported in its minutes following the December, 1999 Council meeting that:



Adapted from Edwards (1990)

The document does not provide definitive evidence on the net benefits of different options for halibut charterboat management. While it provides some new information on the levels of net economic benefits,

it does not provide a comprehensive look at the changes in net economic benefits with different policies. The document would benefit from a brief discussion of the analytical framework that is appropriate for consideration of the allocation decision that is before the Council. However, it is important that all participants in the Council process understand that, even if a comprehensive set of studies were available, such models have limited ability to predict the consequences of major changes in the regulatory structure or management strategy. It will inevitably fall to the Council to decide who should gain at whose expense.

There is not enough information to know whether benefits to the commercial sector could offset losses to the recreational sector following an allocation change. Nor is there enough information to know whether increases in regional economic activity associated with the recreational industry will offset decreases in regional economic activity associated with the commercial industry. In the absence of critical data and more detailed analysis, more specifically geared to GHL issues, the sources in this chapter represent the best available data. They are identified along with their relevant functions in the following table.

Model or data	Data source	Type of evaluation	Comparable data in analysis for other sectors	Caveats / limitations
Ex-vessel demand	NMFS price and quantity time series for Alaska- and Canadian-landed halibut, for other sources see Appendix 3	Provides demand elasticity for projecting total revenue effects of changes in commercial harvests	Participation rate model, to a limited extent	Cannot be used to determine net revenue effects without a cost model; cannot be adequately extended to consumer level to provide net benefit changes to commercial halibut consumers
Sportfishing participation rate model	Lee et al. (1999) survey of Kenai Peninsula anglers, see Appendix 1	Provides responsiveness (elasticities) of participation to various attributes such as cost (demand model) and catch, useful for predicting effects of limiting catch. Also provides estimates of consumer surplus for anglers	Ex-vessel demand model provides elasticity estimates for ex-vessel market, but these are difficult to compare because of differing units of measure	Specific to Kenai Peninsula
Quota share prices (Chapter 3 with discussion in Chapter 4)	CFEC IFQ reports	With more analysis, could provide current and projected estimates of producer surplus (net benefits) expected by commercial harvesters	None	If estimated, would provide expected vs. realized producer surplus
Kenai Peninsula input-output model	Lee et al. (1999) survey of Kenai Peninsula anglers (Appendix 1), angler expenditure analysis (Chapter 3), IMPLAN database	Economic impacts of changes in charter fishery	None	Specific to Cook Inlet fisheries and impacts on the western Kenai Peninsula
Baseline commercial fisheries data (Chapter 3)	NMFS, CFEC, ADF&G	Present levels of economic activity; with development of a commercial fisheries input-output model, could estimate economic impacts	Baseline expenditure data for Kenai Peninsula sport fishery in Chapter 3	Only provides current levels of economic activity

4.4.1 Tools for estimation of net benefits

This analysis relies heavily on two current studies for purposes of describing some of the net benefit aspects of the recreational and commercial halibut fisheries, and references a number of others, where the methodologies used would prove useful for further net benefit estimation if data and time were not constraining factors. Lee et al. (1999b) use the Lee survey data presented in Section 3 of this analysis to model the effect of fishery attributes, such as catch, size, and cost on participation rates in the marine sport fisheries off of the Kenai Peninsula. In addition to deriving point elasticity estimates for both price/quantity of trips and catch/quantity of trips relationships, this modeling also provides average measures for angler surplus, that is the net benefit to anglers from sport fishing. Herrmann (1999) provides a review of the literature on demand for commercial halibut, and updates a variation of a demand model developed in Lin et al. (1988) to describe demand at the ex-vessel level.

Some Critical Assumptions and Comments Needed to Interpret the Economic Results Reported in this Document

1. Logbook data and the models that were used to analyze those data are based on all bottomfish trips taken, and not just halibut trips. Therefore, the number of trips used in this analysis may overstate the number of halibut trips actually taken by guided anglers.

2. The participation rate model results were based on data specific to the western Kenai Peninsula. Expanding the results of that model to other areas would tend to introduce biases if the average guided angler from the western Kenai is not representative of average guided angler in other parts of 3A and 2C.

3. Compensating variation is an estimate of the amount of cost, above and beyond what the average angler pays, that would make the angler indifferent to taking the trip if she had to pay it. In other words, it is the amount of compensation that the angler would have to receive for not taking the trip to leave her as well off as she would have been had she taken the trip

4. Since the western Kenai Peninsula guided halibut fisheries are thought to be different from those in the rest of area 3A and 2C, the compensating variation estimates reported in this document were deemed to be inappropriate for application to the broader 2C and 3A areas.

5. Separate data for guided and non-guided halibut fishing trips were not available for use in the model used to estimate compensating variation. Including both types of trips will alter the net benefit results for guided anglers if guided and non-guided anglers have different levels of compensating variation. Note that the analysis was able to break out resident Alaskans, for them the average per day trip compensating variation is estimated at $61, and for non-residents it is $59.

6. The quantitative results for the one fish bag limit analysis are based on reducing the number of halibut that are expected to be caught (both retained and released) and not just the number of halibut retained. Basing the analysis on reducing the number of fish caught was assumed to represent a probable upper bound estimate of decreased participation.

7. Results from the one-fish bag limit analysis represent the percentage reduction in the likelihood that an angler would still take the halibut trip. An estimate of 90 percent means that the angler is 90 percent less likely to take the halibut trip if they expect to catch only one halibut relative to their current catch expectations (both retained and released fish). It does not necessarily mean that there will be 90 percent fewer trips taken.

8. Results derived from Impact and net benefit analyses are not additive.

9. The reader should understand that different methods for deriving economic values will often yield different results, and that an appropriate approach to net benefit estimation should incorporate a number of methods for comparison.

4.4.1.1 Demand for commercially caught halibut

An understanding of the demand for commercially caught halibut can help to identify the directional change of net benefits to the primary stakeholders in the commercial market: commercial harvesters and final consumers of halibut. The sum of net benefits to each group is the total net benefit derived for this market. In order to quantify the net benefits received by commercial fishermen, we would need to know more about the cost structure for commercial operations, since their net benefits are the difference between the price they receive for halibut and their costs, inclusive of opportunity costs. Current cost data for the commercial sector are not available; this and other net benefit aspects of commercial operations will be discussed in a later section. However, if the sensitivity of price to changes in quantity can be determined at the ex-vessel level, we can predict the direction of total revenue change. Total revenue statements are not a substitute for net revenues, which are really needed for net benefit assessment; however, the following discussion as it relates to price sensitivity (elasticity/flexibility) will demonstrate how this type of information may still be useful.

Net benefits to consumers can be estimated with a demand curve specified at the primary (consumer) level. However, this requires detailed price and quantity data for final halibut products where they are sold and this type of information is very sparse. Alternative approaches to specifying a demand curve at the consumer level, as well as implications for consumer demand given a known ex-vessel demand will be briefly treated below.

The following summarizes a recent discussion paper, Herrmann (1999), that surveys the available literature on halibut demand studies and extends one particular model with updated data to generate elasticities at the ex-vessel level. The discussion paper is attached to this analysis as Appendix 3.

Assumptions and data

Identification of demand for the commercial halibut market is complicated by three recent events that distort the consistency of time series data. These are the shift in management regimes from an open access to individual quota systems in Canada, in 1991, and in Alaska, in 1995, and the dramatic increase in TACs that began in 1997. The extent of these effects on demand may obfuscate the measurable effect of other variables that enter the demand relationship. However, determining their effects in isolation is a statistical challenge.

In his paper, Herrmann presents a historical overview of the real ex-vessel price for halibut, as it relates to not only changes in landings but also changes in the available supply of wholesale product, given inventory fluctuations. After several exercises involving a simple inverse demand equation he uses for expository purposes, he summarizes the results of other studies and selects from them an appropriate methodology for assessing commercial demand. Because of time and data constraints, he only discusses this preferred method (market model using a simultaneous equations approach) and instead selects a simpler version to generate various elasticity measures including season length, cross price, and own price elasticities. The model is a reduced form inverse ex-vessel demand, adapted and modified from Lin et al. (1988), and updated to include present conditions and the structural changes to the fishery mentioned earlier. Model specification and estimated results for included variables are presented in detail in his appended study. Elasticity results, as they pertain to commercial operators and consumers of halibut, are presented next.

Elasticity and implications for commercial harvesters

Elasticity measures the responsiveness of quantity demanded to changes in price. Elasticity is an important concept because it describes the current state of the market and can be used to predict the effects of increased production on producers and consumers. Because elasticity is derived from a demand curve that is a point in time representation of consumer behavior, it is subject to change inasmuch as demand is variable over

time. Structural changes in the marketplace such as the shift in management regimes mentioned earlier can have a notable, but not easily identifiable, effect on demand and consequently on elasticity. Likewise, all of the variables that shift demand such as population, income, preferences, and substitute goods will also influence elasticity. Recognizing the limitations of static point estimates in a dynamic world, such measures are nonetheless relevant because they provide the best available starting point for describing economic characteristics.

The inverse of elasticity, price flexibility, is conversely useful for gauging the effects of quantity changes on price, and will be used throughout the discussion of the commercial market because in this context we are ultimately interested in the price effects of alternative specifications of commercial quota. Price flexibility is defined as the percentage change in price that results from a percentage change in quantity produced. The reason this is relevant to harvesters is that increased production will have an uncertain effect on total revenues if the degree of price sensitivity to changes in quantity are likewise uncertain. Herrmann provides an example to illustrate this point: if one finds a price flexibility of -0.5 this would indicate that if quantity increased by one-percent, then price would decrease by 0.5 percent, leading to an increase in revenues. If on the other hand the price flexibility were -1.5, a one percent increase in quantity would be followed by a 1.5% decrease in the price. This decrease in price has an offsetting effect to the quantity increase, and will result in a revenue decrease. Table 4.4.1 is reproduced below from Herrmann's paper to provide a quick reference for the revenue effects of different price flexibilities.

Table 4.4.1 Matrix example of revenue effects for changing quantities for sample price-flexibilities.

	Price Flexibility = -0.5	**Price Flexibility = -1.0**	**Price Flexibility = -1.5**
	Low Price Sensitivity to Landings	***Medium Price Sensitivity to Landings***	***High Price Sensitivity to Landings***
Quantity Increases	Revenue Increases	Revenue is unchanged	Revenue Decreases
Quantity Decreases	Revenue Decreases	Revenue is unchanged	Revenue Increases

Herrmann notes that his estimated price flexibilities reflect a direct, first round effect of a quantity change, and not the total effect that would be captured by a more dynamic simultaneous equations model. Nonetheless, they provide a good starting point for analysis. He reports that the 1998 point own-price flexibility (for a combined harvest of 66.7 million pounds and combined nominal price of $1.33/lb) is -0.574, which is relatively inflexible. This estimate is statistically different from -1 (unit flexibility/elasticity) at a confidence level of 95%. Because the estimate is less than 1 in absolute value terms, an increase (decrease) in landings can be expected to increase (decrease) total revenues to harvesters. This implies that there is some room for landings to increase before the combined Alaska and Canadian halibut market becomes saturated. Caution must be exercised with these results. Just because total revenues are predicted to increase with increased landings, we cannot conclude that net benefits (economic profits) to harvesters would necessarily increase as well because we do not know the marginal costs associated with the increased harvests. Had the point estimate been a flexible one, we could have unambiguously concluded that the market is saturated and that increases in harvest would have decreased net revenues (because of the decrease in total revenues and increase in costs associated with the extra landings). Instead, with the inflexible estimate of -0.574, we can only ascertain that total revenues would go up and that the change in net revenues would be indeterminate for an increase in production.

While it can be argued that examination of the ex-vessel demand for just Alaskan landed halibut could yield slightly different flexibility estimates, the Alaskan catch dominates the market and likely has a greater role in setting the overall price for Pacific halibut. Therefore, results for the combined market should fairly represent the price flexibilities for Alaskan landed commercial halibut.

Deriving consumer demand for commercially caught halibut to final consumers

To measure net benefits to consumers of commercially caught halibut, some estimate of demand at the consumer level is needed. The discussion on commercial operators above was based on demand calculated at the ex-vessel level. In theory, this ex-vessel price/quantity relationship is referred to as *derived* demand because it can be derived from the *primary* demand at the consumer level (Tomek & Robinson 1972). This was not done, because our ex-vessel data sources are much more robust than are the data at the retail level, making it much easier to estimate ex-vessel demand directly. In fact, sufficient data are not available for estimation of the primary demand function at the retail level, forcing us to take another approach at characterizing this price/quantity relationship.

Since the ex-vessel demand can be derived from the primary demand, the reverse is also theoretically plausible, given certain assumptions about the sum of the margins realized through all of the intermediate marketing levels. Tomek and Robinson (1972) show that the primary demand curve displays similar characteristics to the derived demand for the case when absolute margins are assumed for all quantities marketed. Since the former is essentially just an outwardly shifted version of the latter, elasticities will be the same. However, margins are more likely to vary with quantities marketed. If we accept the general assumption for agricultural markets that margins decrease with lower prices as the quantity marketed increases, the primary demand will be more elastic than the derived demand (Jolly and Clonts 1993). Intuitively, this is a reasonable expectation, given that wholesalers can use inventory levels to mitigate the effects of abrupt quantity changes. Since we found a generally inflexible (elastic) demand at the ex-vessel level, we could expect an even more elastic demand at the retail level. Whether or not this is true for the halibut marketing chain is arguable given a cursory examination of the ex-vessel and first wholesale prices presented in Section 3. It appears that greater margins at the first wholesale level are associated with lower overall prices and larger quantities for 1997 and 1998, but neither sufficient time nor data is available to appropriately analyze this for confounding effects.

4.4.1.2 Contingent valuation model for marine sport fishing off of the Kenai Peninsula

The Lee et al. (1999a) survey elicited responses to a series of ranking and ratings questions for use in two stated preference models. This study will provide two separate methods for arriving at angler net benefits for fishing off the Kenai Peninsula, as well as estimates for the marginal value of a halibut in this fishery which could be compared to the market value of a commercially landed halibut. The final results of these studies were not available at the time this RIR analysis was prepared, although, as the following discussion suggests, preliminary information from these sources was employed, as appropriate.

4.4.1.3 Participation rate model for recreational halibut fishing

This section is excerpted and/or adapted from a working paper by Lee et al. (1999b), and provides technical documentation of a modeling process that simulates how saltwater angler participation is likely to be affected by changes in fishing trip attributes such as cost, catch, and size of halibut and salmon. Derivation of the model is presented below, as are results from simulations that measure participation rate changes for relevant changes to the sport fishery. The model is also useful for generating a net benefit measure for anglers, analogous to consumer surplus.

Data, assumptions, and model specification

As suggested above, the model results presented below are preliminary and represent a work in progress. Panel data obtained from the Lee et al. (1999a) survey of Kenai Peninsula saltwater anglers are used to estimate an econometric model to predict the probability that anglers will take a fishing trip as attributes of

the trip are varied. The stated preference method is a natural choice for such circumstances since anglers' participation decisions will likely depend on many trip attributes. This approach allows for the simulation of a wide variety of alternative scenarios, many of which would not be possible using data from observed fishing activity. The design of the study also allows for the estimation of a non-linear function that includes substitution and complementary effects across attributes, and the possibility of non-linear marginal utility. We use a random effects profit model to account for the panel nature of the data.

The survey-collected data was presented in Section 3, and detailed information on survey design and response rates is contained in Appendix 1 to this report. The modeling and results presented are based on a stated preference survey. Each angler is presented a set of possible fishing trips. Each trip varies in the levels of the fishing trip attributes. The preferences of the angler regarding each trip are then elicited. These attributes include the species (Pacific halibut, king salmon and silver salmon), number and size of fish caught, and the cost of the trip. The advantage of this method is that it is possible to construct experimental designs that allow for the identification of possible substitution and complementary effects across attributes, and the non-linear marginal utility. These types of effects are often difficult to capture from observed activity where attributes can be highly collinear or lack sufficient variation. We elicit preferences on a trip by trip basis through a binary choice variable that indicates whether the angler would take the trip that is presented. This design results in a panel type data set.

The choice decision is modeled in a random utility framework. Let the utility of individual i associated with trip t be given by

$$u_{it} = f(x_{it}, z_i, \mathrm{b}, \mathrm{g}) + e_{it} \qquad \begin{array}{l} i = 1,2,...,\mathrm{N} \\ t = 1,2,...,\mathrm{T} \end{array}$$

where x_{it} is a vector of fishing trip attributes for the ith individual for the tth trip, z_i is a vector of socioeconomic variables for individual i, b is a vector of parameters associated with the fishing trip attributes, g is a vector of parameters associated with the socioeconomic variables, and e_{it} an error term. For each trip t the individual is asked whether she would take the proposed trip consisting of attributes x_{it}. If the answer is "yes", the individual receives a utility level of u_{it}. If the answer is "no" the individual receives the utility level associated with not taking the trip, $u_{i0} = f(0, z_i, \mathrm{b}, \mathrm{g}) + e_{i0}$. Since the actual levels of utility are not observed, the model is made operational by specifying a binary indicator, y^*, that denotes which choice was made.

In particular let

$y^*_{it} = 1$ if $u_{it} \geq u_{i0}$ (the respondent answers "yes") and
$y^*_{it} = 0$ otherwise.

A probabilistic choice model can then be formulated by noting that

$$\begin{aligned} \mathrm{Prob}[y^* = 1 \mid x_{it}, z_i] &= \mathrm{Prob}[u_{it} \geq u_{i0}] \\ &= \mathrm{Prob}[f(x_{it}, z_i, \mathrm{b}, \mathrm{g}) + e_{it} \geq f(0, z_i, \mathrm{b}, \mathrm{g}) + e_{i0}] \\ &= \mathrm{Prob}[f(x_{it}, z_i, \mathrm{b}, \mathrm{g}) - f(0, z_i, \mathrm{b}, \mathrm{g}) + e_{it} - e_{i0} \geq 0\ ] \\ &= \mathrm{Prob}[f(x_{it}, z_i, \mathrm{b}, \mathrm{g}) - f(0, z_i, \mathrm{b}, \mathrm{g}) + \mathrm{e}_{it} \geq 0\ ] \end{aligned}$$

where $\mathrm{e}_{it} = e_{it} - e_{i0}$.

There are several econometric models that take advantage of the panel nature of our data set. Two natural choices are the fixed effects model following Chamberlain (1980) or the random effects model following Butler and Moffitt (1982). Since we have a random sample of individuals from a larger population of interest, the random effects model is usually thought to be more appropriate (Maddala, 1987; Green, 1997). One reason for this is that a fixed effects model assumes that individual heterogeneity can be captured by an

individual's specific parametric shift in the response function. This would be appropriate if one is interested in forecasting responses for those particular individuals. The random effects model, on the other hand, assumes that there is an underlying correlation within each individuals' responses. This framework is more appropriate when an inference about a larger population is to be made based on a sample drawn from that population. Furthermore, the random effects model allows the researcher to include t invariant variables in the model (e.g., socio-economic variables, z_i), while the fixed effect model does not, and thus, precludes estimating y.

The Butler and Moffitt model assumes that the error term is composed of a component that varies across i and t (both individuals and trips) and a component that varies across i (individuals only) only. Hence,

$$e_{it} = m_{it} + n_i.$$

where each component is from an independent normal distribution with zero mean and unit variance. The model is therefore called a random effects profit model. The mit are assumed to have constant correlation across t. This assumption greatly reduces dimensionality of the problem, and requires the estimation of only one additional parameter, r = Corr(eit, eir). The presence of a statistically significant random effect can be tested using the estimated t-statistic for r. The approach taken in this paper is to use the model of Butler and Moffitt and test for the presence of a random effect. A Monte Carlo experiment by Guilkey and Murphy (1993) has shown that use of the standard binomial profit model, in cases where there is a random effect, can bias the estimates of the parameters' standard errors.

Each trip was composed of six fishing characteristic attributes and a cost per day. Respondents were told that the cost per day is for fishing related costs like tackle and bait purchased specifically for the trip, charter/guide fees, and fishing transportation costs like auto or boat fuel (see Section 3 for details on angler expenditures). The fishing characteristics are halibut catch per day, average halibut size, king catch per day, average king size, silver catch per day, and average silver size. The levels of each attribute were derived by examining historical data and through pre-test discussions with anglers. The attribute levels used in the experimental design are presented below.

Cost per day	{ $100, $170, $240 }
Halibut catch per day	{ 0, 2, 4, 6 }
Average halibut weight (lbs.)	{ 0, 20, 40, 80}
King catch per day	{ 0, 1, 2 }
Average king weight (lbs.)	{ 0, 15, 25, 50}
Silver catch per day	{ 0, 2, 4, 6 }
Average silver weight (lbs.)	{ 0, 7 }

A design was developed to create 27 trips that were to be placed in nine blocks of three trips each. Each angler would then be randomly assigned to one of the nine blocks. The design was created by first forming the full factorial design of 2,304 possible trips. All trip combinations where a catch of zero for a species was not matched with a size of zero, or vice versa, were deleted. Since it is unrealistic to expect to catch all three species during one day, all such trips were deleted. From the remaining trips, a block design was created using the SAS Optex procedure to search for a ranking of designs based on the D-optimality criterion. A computer algorithm was then used to remove entire designs where at least one of the three trips in a block was dominated by any of the other two trips in the same block. The domination criterion only assumed that preferences are such that larger size is preferred to small size (within a species), that more catch is preferred to less (within a species), and lower cost is preferred. This procedure has the advantage of eliminating choices where little if anything is learned by the revealed choice, but the disadvantage of not allowing the researcher to test for the transitivity of preferences. Half of the surveys contained three additional questions that asked whether respondents would take the proposed trip. These responses were used in the model.

The number of individuals in our data set is 352 (N=352). Each individual answered three different conjoint questions (T=3). The total number of observations is 1,056. Socioeconomic data available for each individual and incorporated into the model is their household income (HHINC) which is in thousands of dollars, their gender (GENDER) which is a binary indicator variable equal to one if the individual is male and zero otherwise, their age (AGE) given in years, and their level of education (ED) which is a binary indicator variable equal to one if the individual has graduated from college and zero otherwise. An important modeling consideration is that Alaska State residents may exhibit different preferences for fishing trips than Non-Alaska, US residents. We therefore have created the dummy variables AK and L48 to denote whether the individual is an Alaska resident (AK), or resides in a state other than Alaska (L48)[1]. Summary statistics for these variables are presented in Table 4.4.2.

Table 4.4.2. Respondent Socioeconomic Summary Statistics

Variable	Mean	Std. Dev.	Min	Max
Alaska Resident Respondents N=158				
HH INC_AK ($10,000)	2.1577	1.2661	0.02	7.00
GENDER_AK (1=male)	0.7342	0.4432	0.00	1.00
AGE_AK	42.3734	11.9817	17.00	74.00
EDUCATION_AK (1= college graduate)	0.3481	0.4779	0.00	1.00
Days Fished_AK	9.1013	11.9047	1.00	63.00
Non-Alaska Resident Respondents N=194				
HH INC_48 ($10,000)	2.8139	1.7016	0.25	11.00
GENDER_48 (1=male)	0.7526	0.4326	0.00	1.00
AGE_48	48.1392	14.3208	16.00	83.00
EDUCATION_48 (1= college graduate)	0.5000	0.5013	0.00	1.00
Days Fished_48	4.2294	5.0248	1.00	48.00

A hybrid quadratic function was selected to represent utility. This function was chosen because it allows for non-constant marginal utility; the estimation of cross effects (substitution or complementary) across species can be easily modified to accommodate socioeconomic variables and allows for the estimation of a model that is linear in parameters. We have chosen to combine the catch and size of each species of fish to make a variable representing pounds of fish (w). This allows for a more parsimonious model given the large number of parameters that need to be estimated, the identification of all quadratic terms, and can be modified to add separate variables (species catch or species size) where appropriate.

Halibut catch is denoted as HC, halibut size as HS, king catch as KC, king size as KS, silver catch as SC, and silver size as SS. The pounds of fish variables are then denoted by $w_{halibut}$ = HC*HS, w_{king} = KC*KS, and w_{silver} = SC*SS for halibut, king salmon, and silver salmon respectively. We also add the variables HC and HC^2 to the quadratic. Since the range of HC is [0,6] in the study design, one may expect that these terms may be important since the number of fish anglers are allowed to keep is two[2]. The last remaining fishing trip

[1] L48 is meant to represent "Lower 48" residents. This definition also includes residents of Hawaii.

[2] It was not possible to add these terms for silver salmon since SS is constant at 7. Such terms were not feasible for king salmon either because the range of king catch was [0,2].

attribute is the cost of a fishing trip, which we denote by PRICE. The model to be estimated, including the demographic variables is therefore

(1)

$$y_{it}^{*} = \beta_0 + \sum_s \beta_s w_{it,s} + \sum_j \sum_s \lambda_s w_{it,s} w_{it,j} + \pi_p price + \pi_{hc} hc + \pi_{hc^2} hc^2 + \sum_l \gamma_l z_{i,l}$$

for all s and j = {halibut, king, silver} and l = {HHINC, GENDER, AGE, ED}. Equation (1) is estimated with the dummy variable AK and L48 fully interacted with it. This allows for the estimation of different parameters for each group[3]. However, since the same general study design was presented to each group, we only estimate one random effect parameter.[4]

The estimated results are contained in Table 4.4.3. The model was estimated with Limdep 7.0 for Windows (Green, 1998). The random effect parameter, ρ, is statistically different from zero at the 99% level (p = 0.0057). This indicates that there is an identifiable random effect. In total, 35 different parameters are estimated. Fifteen of the parameters are significantly different from zero at the 1% level, ten are significant at the 5% level and two are significant at the 10% level. The point estimates of the parameters accord well with economic theory. The price coefficient is negative, as one would expect. The halibut, king, and silver weights, and the halibut catch terms are all positive. The weight squared terms and the cross terms are all negative, implying that anglers exhibit decreasing marginal utility and that each of the three species are substitutes for each other.

[3] The p-value the H_0 that all parameters are the same across AK and L48 is 0.18. Although this is not statistically significant at the usual level, we have chosen to separate the two groups since many of the individual and grouped parameters are statically different from each other and some important policy considerations may necessitate separate estimates.

[4] Furthermore, the p-value for the H_0 the $rho_{AK} = rho_{L48}$ is 0.52 (χ^2= 0.4134 with 1 d.f.), indicating that it is quite unlikely that they do not share a common random effect parameter.

Table 4.4.3. Random Effects Probit Parameter Estimates

AK Resident Parameters	Estimates	**Non-AK Resident Parameters**	Estimates
AK	-2.8415	L48	-1.4746
	(-3.03)		(-1.86)
PRICE_AK	-0.0124	PRICE_48	-0.0094
	(-7.39)		(-6.96)
HC*HS_AK	0.0371	HC*HS_48	0.0228
	(3.30)		(2.53)
KC*KS_AK	0.1037	KC*KS_48	0.0732
	(4.32)		(3.56)
SC*SS_AK	0.1242	SC*SS_48	0.1163
	(2.95)		(3.19)
$(HC*HS)^2$_AK	-0.0001	$HC*HS)^2$_48	-0.0001
	(-2.88)		(-1.33)
$(KC*KS)^2$_AK	-0.0006	$(KC*KS)^2$_48	-0.0004
	(-3.41)		(-2.52)
$(SC*SS)^2$_AK	-0.0008	$(SC*SS)^2$_48	-0.0011
	(-1.13)		(-1.82)
HC*HS*KC*KS_AK	-0.0005	HC*HS*KC*KS 48	-0.0004
	(-3.50)		(-3.20)
HC*HS*SC*SS_AK	-0.0007	HC*HS*SC*SS_48	-0.0005
	(-2.84)		(-2.38)
KC*KS*SC*SS_AK	-0.0018	KC*KS*SC*SS_48	-0.0010
	(-3.60)		(-2.26)
HC_AK	1.1033	HC_48	0.9241
	(2.05)		(2.33)
HC^2_AK	-0.1492	HC^2_48	-0.1297
	(-2.19)		(-2.52)
HH INC_AK	0.0945	HH INC_48	-0.0021
	(1.09)		(-0.04)
GENDER_AK	0.3853	GENDER_48	0.0963
(1=male)	(2.03)	(1=male)	(0.57)
AGE_AK	0.0080	AGE_48	-0.0003
	(1.04)		(-0.05)
EDUCATION_AK	0.2827	EDUCATION_48	0.3853
(1=some college or more)	(1.39)	(1=some college or more)	(2.49)
r	0.1921		
	(2.77)		
N	1,056		
LogL at convergence	-542.5028		
LogL at parameters=0	-731.0465		
McFadden R^2	0.24921		
Veall and Zimmermann R^2	0.44181		

Notes: *t*-ratios are in parentheses.

Participation rate changes for halibut fishing off the Kenai Peninsula

All simulations are based on the sample enumeration method (Ben-Akiva and Lerman, 1987). A forecast is made for each individual in the sample. This method takes into account differences in the sample (and underlying population) of socioeconomic characteristics. Variability in the number of days fished per year in saltwater off the Kenai Peninsula is another type of variability that sample enumeration allow us to incorporate in the simulations. We use this information to weight all simulation by the number of days fished. Separate forecasts are made for the Alaska State and Non-Alaska State residents.

The general formula for all forecasts is based on the following equation:

(2)

$$\%\ \Delta\ Participation_{\alpha} = \frac{\sum_i [\Phi(\hat{u}_{i,1})\, days_i] - \sum_i [\Phi(\hat{u}_{i,0})\, days_i]}{\sum_i [\Phi(\hat{u}_{i,0})\, days_i]}$$

where $\hat{u}_{i,j}$ is the forecast of indirect utility for individual i with the fishing attributes j, $j = 0$ denotes the initial or starting point fishing trip attributes and $j = 1$ denotes the new fishing trip attribute levels based on an α percent change from the $j = 0$ levels, $\%\ \Delta$ means percentage change, $\Phi(.)$ is the cumulative normal distribution function, and $days_i$ is the number of days individual i fished in saltwater off the Kenai Peninsula in 1997.

Price elasticity of demand for trips

The first set of simulations shows the responsiveness of the participation rate to changes in the fishing cost or price per day. Separate results for Alaska residents and non-residents are presented in Figure 4.1. Three different starting points for fishing costs per day are used, and each cost per day is decreased and increased over the interval [-25%, 25%]. The resulting change in the participation rate is graphed. A measure of price elasticity can be determined for any point on a graphed line by dividing the percentage change in the probability of taking a trip by the percent change in the cost. For both residents and non-residents, the elasticity measure is increasing in cost per day, as would be expected. It is interesting to note that elasticity is relatively inelastic for costs per day, similar to those observed for the average saltwater fishing trip that includes halibut and salmon, $53.65 for non-local Alaskans and $138.27 for non-residents (see Table 4.4.4).

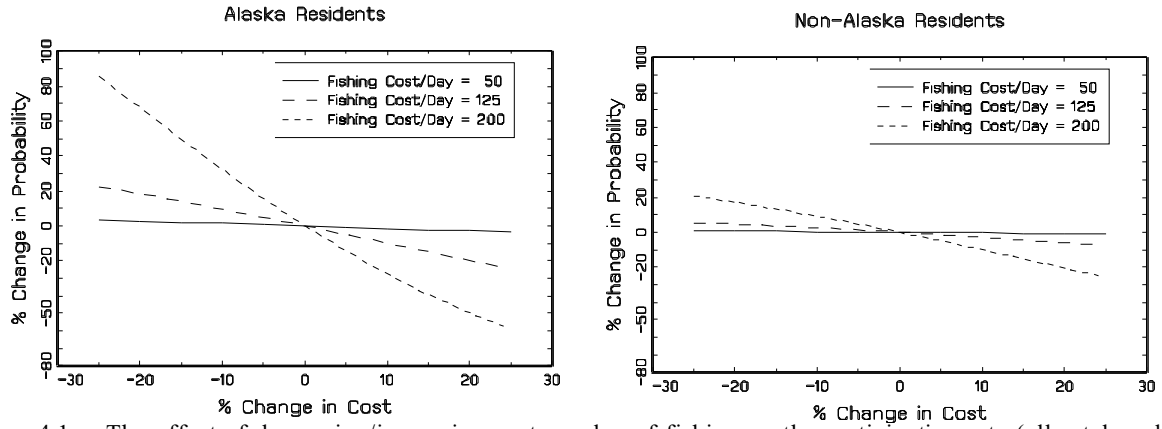


Figure 4.1 The effect of decreasing/increasing cost per day of fishing on the participation rate (all catch and size variables are at the survey mean levels, see Table 4.3)

For all levels of cost, resident Alaskans respond to price differences in a more elastic fashion than do non-residents, as one would expect given the difference in average incomes for both groups and the greater opportunities for substitute fishing trips available to residents. However, it may not be appropriate to present elasticity estimates for the same levels of cost across residents and non-residents, since their average costs are substantially different. They thus have different starting points for attributes that mirror cost, catch and size attributes of the average halibut-only charter trips in Cook Inlet off the Kenai Peninsula. For Alaskans, the elasticity in absolute value terms is 0.71 and for non-residents it is 0.94 (based on a starting fishing cost of $141.30 for Alaska residents and $207.93 for non-Alaskans [Table 4.4.4]). By specifying the actual costs paid by residents and non-residents, non-residents appear to have a relatively more elastic response. The reasons for this are not intuitively clear. However, it should be noted that these point elasticities are very sensitive to change in the values of trip attributes, and that the statistical significance of the differences in the estimates provided above has not yet been checked. Since confidence intervals are not available at this time, these point estimates represent the best estimate for the price elasticity of demand for halibut charter trips off the Kenai Peninsula.

Table 4.4.4 Means of fishing trip attribute variables by residency[a].

Residency	All Species Ave. Trip	Halibut Only Trips
Alaska		
Fishing Cost	$53.65	$141.30
Halibut Catch	1.87	3.61
Halibut Size (lbs.)	32.97	33.54
King Catch	0.22	---
King Size (lbs.)	28.76	---
Silver Catch	0.12	---
Silver Size (lbs.)	7.98	---
Non-Resident		
Fishing Cost	$138.27	$207.93
Halibut Catch	2.67	3.45
Halibut Size (lbs.)	41.33	43.51
King Catch	0.25	---
King Size (lbs.)	29.00	---
Silver Catch	0.20	---
Silver Size (lbs.)	7.13	---

[a] The data are based on Lee et al. (1999).

Anglers' behavioral response to reductions in expected catch

The second set of simulations examines how expected changes in catch affects participation rates. The first panel in Figure 4.2 depicts the average Kenai Peninsula marine sport fishing trip where all three species are caught. Average values for all catch, size and cost variables come from Table 4.4.4. The graph shows how participation rates respond to simultaneous changes in the catch of all three species. Both residents and non-residents respond to negative changes in a near one-to-one manner for changes in catch close to the mean. However, the function exhibits increasing curvature over the range, and participation becomes increasingly sensitive to reductions in expected catch. The response to positive changes is smaller, especially for non-residents. This results from the estimated decreasing marginal values of catch of each species. The second panel in Figure 4.2 uses data from trips where only halibut are targeted. The mean values of the variables are from Table 4.4.4. The response is quite similar for residents and non-residents. Anglers respond more sensitively to catch decreases than catch increases.

Confidence bounds around some of the point estimates in Figure 4.2 are presented in Table 4.4.5. Since the point estimates are highly non-linear, the 90% confidence intervals were simulated using the method proposed by Krinsky and Robb (1996). In absolute magnitude, the 90% bounds are generally larger for Alaska residents than for non-residents. For example, the 90% bounds for a 25% reduction in catch for Alaska residents for an all species trip is [-38.27, -11.58], while the bounds for non-residents is [-23.37%, -9.96%].

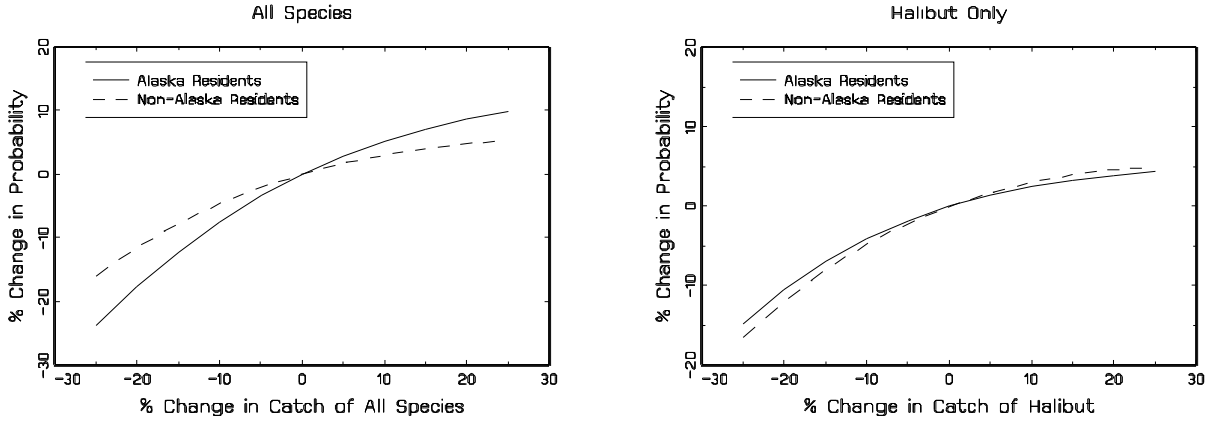


Figure 4.2 The effect of decreasing/increasing the average mean catch on the participation rate (all catch and size variables are at the survey mean levels, see Table 4.3)

4.4.1.3.1 Summary of results for participation rate model

By varying the attributes of a fishing trip, such as anticipated catch or cost, the participation rate model was used to predict how saltwater anglers would respond to changes in catch and cost of a fishing trip. By varying the cost attribute, the participation rate model took on a price dependent demand relationship from which we derived elasticity measures. The same was done for variations in halibut catch, where the starting point means reflected averages for halibut-only trips from the Lee survey. These elasticities are not exactly analogous to the ones reported for the commercial fishery earlier in Herrmann's work because they are based on quantities of trips as opposed to quantities of fish. While it would not be appropriate to compare these elasticities across sectors without translating the ones for the charter sector into a per unit of fish measure, they are still useful for revealing angler responsiveness to changes that could be prompted by GHL management measures. It may also be difficult to translate charter elasticity measures into ones that are comparable to the commercial sector, because they arguably may also represent measures other than the quantities of halibut.

Table 4.4.5 Mean and 90% confidence intervals of the simulated effect on participation rates from a change in catch*.

	Alaska Residents			Non-Alaska Residents		
Change in Catch	Mean	Lower	Upper	Mean	Lower	Upper
All Species Trips[a]						
-25%	-23.74%	-38.27%	-11.58%	-15.95%	-23.37%	-9.96%
-10%	-7.44%	-13.39%	-3.30%	-4.64%	-7.73%	-2.50%
+10%	5.19%	2.05%	10.45%	3.00%	1.23%	6.06%
+25%	9.97%	3.60%	22.02%	5.36%	1.45%	12.66%
Halibut Only Trips[b]						
-25%	-14.90%	-27.47%	-6.16%	-16.62%	-25.88%	-9.20%
-10%	-4.10%	-8.68%	-1.46%	-4.80%	-8.82%	-2.04%
+10%	2.49%	0.73%	6.31%	3.00%	0.47%	6.93%
+25%	4.33%	1.08%	12.18%	5.00%	-1.99%	14.68%

[a] Based on all modes trips from Table 3.

[b] Based on halibut-only trips from Table 3.

* Confidence Intervals are based on the Krinsky-Robb Monte Carlo method (1986) with 10,000 draws.

Referring to Figure 4.1, it is apparent that resident Alaskans react more sensitively to changes in price when the same price level is applied to both groups. Overall though, they both have relatively inelastic responses. Changes in catch have a near one-to-one effect on changes in participation for changes close to the mean, both residents and non-residents, where all saltwater species are included for modeling. Yet when halibut are modeled independently, responses to catch for all residencies begin in a relatively inelastic fashion. As levels of catch further decrease (for all species or halibut-only), participation rates become more sensitive at an increasing rate.

4.4.2 Angler net benefits

The participation rate model can be extended to estimate the compensating variation for an average angler. Compensating variation is analogous to consumer surplus, the measure of net benefit consumers receive for consuming a good. In the case of anglers, this translates to the difference between what anglers would be willing to pay to fish and what they actually do pay. Simply stated, compensating variation is an estimate of the amount of cost, above and beyond what the average angler pays, that would make the angler indifferent to taking the trip if she had to pay it. In other words, it is the amount of compensation that the angler would have to receive for not taking the trip to leave her as well off as she would have been had she taken the trip.

This section describes the technical derivation of an average compensating variation from the Lee et al. (1999b) participation rate model and the underlying assumptions for its use. The technical discussion is then briefly followed with an application of the results toward a simple estimation of net angler benefits for the Cook Inlet sport fishery off of the Kenai Peninsula.

The calculation of compensating variation from the participation rate model can be shown by assuming a simple indirect utility function where utility is derived from halibut catch and the cost of the trip (the results are easily expanded to our more complex model). Let $U = f(h,P)$ where U is utility, h is halibut catch, and P is the price of a halibut trip. Estimation of the indirect utility function yields

$$U = \beta_h h + \beta_p P \qquad (1)$$

where β_h is the marginal utility of an additional halibut catch and,
β_p is the marginal utility of income

Dividing through by β_p and multiplying by -1 yields

$$-U / \beta_p = -(\beta_h / \beta_p)\, h - P \qquad (2)$$

Note that $\beta_p < 0$. Simply stated this means that $-U / \beta_p$ equals the value of all halibut caught less the price of the trip which is equivalent to the value of a trip above the price already paid. This is because (β_h / β_p) is the ratio of the marginal utility of halibut catch to the marginal utility of income, which in turn is the marginal rate of substitution (MRS) of income for halibut. The MRS can be interpreted as the value of an additional halibut holding utility constant. Therefore $-(\beta_h / \beta_p)\, h$ is the gross value of a halibut trip (before subtraction of price). $-U / \beta_p$ is then the compensating variation. An assumption behind these calculations is that the marginal utility of each additional trip for an individual average fisherman is constant. This assumption may be valid in our case as the survey asked about taking a halibut trip where catch and prices were expressed on a per day basis, so presumably the respondent was answering a question that allowed for multiple day trips. To the extent that marginal utilities of additional halibut trips vary (either up or down), the resulting estimated compensating variations will set either a lower or upper limit on the true compensating variations.

Using the values for mean halibut-only trip attributes from Table 4.4.4, average compensating variations were estimated for residents and non-residents. For resident Alaskans, the average per day trip compensating variation is estimated at $61, and for non-residents it is $59. This means that on average, resident anglers in the Cook Inlet halibut fishery realize $61 worth of benefits above and beyond the cost of the trip and that likewise, the average non-resident net benefit is $59 per day trip. These values do not speak specifically to halibut charterboat trips, but to halibut trips in general, inclusive of fishing done on private boats. The average net benefits associated with halibut charter fishing may be overstated or understated according to these values. The values reported are for the total value anglers associate with the fishing trip. In recreational fisheries it often includes benefits beyond the actual fish harvested (i.e., being out on the water and seeing marine mammals). Also, statistical tests of significance have not been performed on these point estimates, so they should be taken as a preliminary benchmark.

If we assume that the average compensating variations have remained constant through all of 1998, and further assume that they can be used to represent values for the charter sector of the sport fishery (recall that the estimates of compensating variations were based on the average halibut angler which includes both guided and non-guided anglers), then we can multiply them by the number of bottom fish (bottom fish trips cannot be divided into halibut and other groundfish trips - but the number of bottom fish trips is assumed here to approximate the number of halibut trips, since the charter fisheries for other groundfish species are currently limited) charterboat angler days in Cook Inlet in 1998. There were 16,779 resident angler days and 43,700 non-resident angler days targeting bottomfish launched from the western Kenai Peninsula (see Table 3.44) in 1998. Multiplying the number of days fished by the compensating variation, the net benefit estimates in monetary terms are estimated to be $1,030,414 and $2,573,515 for residents and non-residents respectively, for a combined total of $3,603,929 in the western Kenai Peninsula.

A measure of the total economic value can be computed by adding the net benefits to the total expenditures attributable to the halibut charter sport fishery in the same area. Referencing Table 3.47, the total expenditures for 1998 were estimated at $19,320,943 in the western Kenai Peninsula. Therefore, total economic value estimated for the western Kenai Peninsula halibut fishery is $22,924,872. Total economic value is not net benefit since it includes the costs of providing the charter service. Instead it is the sum of net benefits to anglers (compensating variation) plus the net benefits to charter operators (economic profits that account for opportunity costs) plus the cost of providing the charter service. The total expenditures include net benefits to charter operators plus the cost of providing the service and other opportunity costs, but without being able to distinguish how much of the total expenditures are realized as economic profit to charter operators, we cannot estimate total net benefits to the halibut charter fishery. A discussion for arriving at a proxy of charter operator net benefits will follow in a later section.

Though it is tempting to apply the average compensating variations above to the total number of halibut charter angler days in Area 3A to estimate angler net benefits for the entire 3A fishery, the participation rate model is based entirely on estimates of utility associated with the fisheries off of the Kenai Peninsula, as well as mean value attributes for this area gleaned from the Lee et al. (1998a) survey. Extension of the model to all of Area 3A would not be appropriate.

Caution must again be emphasized for relying on the point estimates for compensating variation presented above. These measures are preliminary and have not yet been tested for significance. Furthermore, the reader should understand that different methods for deriving economic values will often yield different results, and that an appropriate approach to net benefit estimation should incorporate a number of methods for comparison. For clarity sake it is important to again point out that the estimates derived were based on the total number of bottomfish trips. Since it is likely that some number of the bottomfish trips targeted a species other than halibut, the numerical results derived in this section may overestimate the economic benefits resulting from halibut trips.

4.4.3 Quota share prices as proxy for expected net benefits to commercial fishing sector

Under the current IFQ regulations, halibut quota shares are transferable to a pool of eligible buyers, as long as specific transfer provisions defined in the program are met (i.e., the buyer does not hold too many QS blocks). The pool of buyers is comprised of the initial quota share recipients and persons holding Transfer Eligibility Certificates (TEC).

In a transaction where the buyer and seller agree to a sales price that represents the true value of the quota shares, the price should be equal to or greater than the seller's assessment of the present value of the stream of net revenues that can be produced by that quota and be equal to or less than the buyer's assessment of the present value of the stream of net revenues. Net present value is the sum of discounted future profits. That is, the profits for each year considered would be adjusted to reflect the time value of money. Although the buyer and seller may perceive slightly different discount rates, the discount rates will be closely tied to the interest cost of capital.

Profits are calculated as total revenue expected from the halibut harvested with the quota minus the total cost of harvesting the halibut and a risk premium. Because quota shares do not represent a static number of pounds of halibut, the sellers' and buyers' estimates of net present value are subject to anticipated changes in the TAC and a variety of other factors affecting the supply and demand of halibut (Criddle et al, 1999).

Therefore, the sales price of quota share may provide a proxy for each individual's producer surplus. Not all quota shares are transferred each year, so an estimate of producer surplus could only be made by applying an average sales price to the quota that was not transferred. Making that calculation would require assigning prices to quota shares by area, vessel class, and by whether the quota was blocked or unblocked (CFEC, 1999). If a representative price could be estimated for each type of quota share, then a proxy of producer surplus for the commercial sector could be estimated. However, the analysis would need to recognize the variation surrounding quota share price estimates and changes that have occurred in the fishery that effect the net present value of the quota, since the prices used in the calculation were estimates.

It is important to recognize that while the price of quota shares can be related to the present value of expected producer's surplus, it does not necessarily reflect the accrual of that surplus to the current quota share holder. Although initial recipients received their quota share gratis, those who purchased quota share from initial recipients paid at least as much as the sellers' reservation price. If the buyers and sellers form rational expectations, the sales price will be the capitalized present value of expected future revenues, and that value will accrue to the seller. The buyer may expect to earn a normal economic return on their capital investment (quota shares, vessel and gear, and personal labor); positive accounting profits, but no pure economic profit.

4.4.4 Expenditure based measures of impact

"Economic impact assessments" use the dollar value of exchanges among economic players in a region as a baseline for evaluating hypothetical shocks to the region. Economic impact modeling has taken several forms that vary in their complexity and degree of grounding in economic theory. Generally, there is a give and take between theoretical appropriateness on the one hand and usefulness in real world applications on the other, and the level of detail necessary for policy-related issues renders the more complex modeling processes prohibitively costly and cumbersome to work with. For this reason, the less costly input-output models (I/O) have emerged as a practical approach to measuring impacts in the policy arena. Herrmann et al. (1999) note that I/O models have been used extensively outside of Alaska for impact analysis of development and government policy changes. These include economic descriptions of resource issues such as forestry (Summers and Birss 1991), regional impacts of federal grazing policies (Geier and Holland 1991), community development strategies (Geier et al. 1994), and the impact of federal land use decisions on

regional economies (Fawson and Criddle 1994). I/O models have also been employed to model the Alaska statewide economy (Logsdon et al. 1977, Weddelton 1986).

I/O models are an attractive option for analysts because of the relatively low cost of acquiring prepared I/O data as well as the relative ease of conducting analysis from ready-made, over-the-counter packages. For this reason, I/O modeling has often been used hastily and irresponsibly and has been subject to deserved criticism. Archer (1984) provides specific examples of the misuse of I/O results and the misleading policy implications that ensue. Finally, it cannot be overemphasized that economic impact analyses based on monetary transactions are not intended to elicit results in terms of net benefits. They are instead useful for delineating the regional linkages among the participants of a region's economy and show how shocks to the region affect these participants in terms of output of commodities and services , employment, and income. The nature of the impacts generated by I/O models comes from the multiplicative effect of expenditures as money circulates from an economy.

4.4.4.1 Summary of Council findings from 1997 document

An economic impact assessment conducted for the Council's 1997 Council analysis estimated total expenditures to the State attributable to halibut charter activity to be $28.99 million in 1995. The personal income generated from this amount was estimated at $17.453 million, and 532 full-time equivalent jobs (or 1,064 total jobs) existed because of spending on halibut charter fishing. For more information on the assumptions and derivations of these estimates, the reader is referred to the original document (NPFMC 1997). It is important to note that economic activity estimates from the 1997 document cannot be directly compared to the estimates of net benefits in this document (economic activity measures such as estimated using input/output models and net benefit calculations are derived differently and represent "different" impacts). Also, measures of economic activity are estimated for specific geographic regions. If a consumer elects to spend their dollar in a different geographic location, the impacts are "transferred" from one location to another, producing no change in net benefit.

4.4.4.2 Current input-output (I/O) modeling (adapted from Herrmann et al.(1999))

The I/O modeling used in the Herrmann et al.(1999) study and relied upon in this analysis begins with the IMPLAN database, developed for the U.S. Forest Service (Olson et al. 1993). It is the most commonly used I/O model. The IMPLAN database includes 21 economic and demographic variables for 528 industrial sectors for all counties (and boroughs) of the U.S. The database is largely built off employment and income data sets including County Business Patterns, ES 202, and Regional Economic Information System. In cases where there are disclosure problems, IMPLAN uses national averages as estimates for income and employment. The IMPLAN database is recognized as the best source of U.S. secondary regional economic data. Nevertheless, although the national level data is regularly updated, the regional data is updated infrequently. Moreover, regions may have unique economic sectors or linkages that are not well represented in the basic IMPLAN model. Consequently, it is important to update, regionalize, and groundtruth the model before relying on it to predict regional economic impacts. In Alaska, with small numbers of firms (frequent disclosure problems), and a rapidly evolving and heavily resource-dependent economy, it is particularly essential that the transaction coefficients be thoroughly updated and carefully groundtruthed with local data and expert knowledge. Because groundtruthing is a time consuming and costly process that calls for fieldwork in the study area, painstaking effort in adjusting the model can only come at the expense of a limited geographic scope. For this reason, the Herrmann study only focuses on impacts to the western Kenai Peninsula for saltwater sportfishing in Cook Inlet. Though impacts to the rest of the state are also being considered, impact results outside of the Kenai region are not expected to be available soon.

4.4.4.2.1 I/O model of Cook Inlet saltwater sport fishery on the western Kenai Peninsula economy

The total estimated angler expenditures along with effort data reported in Section 3 were used to construct a baseline for the (I/O) model. The IMPLAN database for four zip codes representing the western Kenai Peninsula were selected and groundtruthed to 1997 values for output, employment and income, following guidelines set forth in Geier et al.(1994). Because industries relevant to the recreational fishery are not explicitly reflected in IMPLAN but instead subsumed within highly aggregated sectors, it is necessary to disaggregate these industries into the sectors of interest. This has been a recurring problem for analysts charged with evaluating policy impacts to sectors that are subsumed within a larger sectoral grouping in IMPLAN, and a literature of disaggregation techniques has developed as a result (see Wolsky (1982), Probst (1985), Gillen and Guccione (1990), and Jensen (1997)). The chosen method of disaggregation in the Herrmann study involves running impact scenarios in IMPLAN to simulate the production characteristics of relevant sectors. Response coefficients (multipliers) are generated from this process and can be used as the basis for a separate, free standing recreational I/O model. This process mirrors the methodology used for the Recreational Economic Impact Model (REIM), developed by William Jensen and Hans Radtke, of Jensen Consulting (1997), and some of the production recipes in the Herrmann study default to those models.

The recreational model that was developed predicts impacts to the regional economy of the western Kenai that arise from simulated changes in guided and/or unguided sport fishing attributes. The angler response to changes in fishing trip attributes measured with the Lee participation rate model can be translated into changes in expenditures attributable to the halibut charter fishery. While the participation rate established by Lee's model speaks generically to patterns for all saltwater sportfishing in the Kenai, mean values for charter-type trips can be used to simulate the effect of changes to the halibut charter fishery such as increases in price or changes in expected catch. The resulting changes in angler demand for fishing trips can then be expressed in terms of the change in resulting angler-related expenditures from the baseline provided in Section 3.

The reader is reminded that several assumptions were made to expand the model from the western Kenai region of Alaska to the entire Southcentral region of the state. Simply stated, it was assumed that the fishery in the western Kenai is representative of charter fishing in all areas of Southcentral Alaska. This assumption is necessary to use the model for the entire area. However, the model results will be biased to the extent that some areas of Southcentral Alaska are not well represented by consumer preferences and economic activities in the western Kenai region.

The reader is also reminded that these impact analysis values are not measures of net benefits, but instead impacts caused by changes in monetary transactions. Monies not spent in the Kenai as a result of catch reductions would likely flow to other regions where the expected catch is not as constraining, as recreationists seek out the next best fishing opportunities.

4.4.4.2.2 Estimates of impacts on output, income and employment from expenditures related to recreational fishing

Economic impacts to the western Kenai Peninsula will depend on the portion of angler expenditures spent in the Kenai region. It should be noted that estimates that ignore fishing-related spending elsewhere in Alaska will tend to understate impacts to the extent that there is interregional trade between the Kenai Peninsula and the rest of Alaska; therefore, estimates derived this way can be regarded as a lower bound. The angler expenditures attributable to charter fishing for halibut spent on the western Kenai in 1998 can be found Table 3.47 of Section 3. These are reproduced below in Table 4.4.6.

It should be noted that if management measures are imposed in one area which, say, restrict the number of fish that can be taken, anglers may choose to fish in a different area where the fishing restrictions are not as binding, or even choose not to fish at all, but instead frequent other areas providing alternative recreational activities. To the extent that such a recreational expenditure shift occurs, it reflects a "transfer" of economic activity within the overall economy, not a net benefit loss or gain. Economic activity measures (e.g., expenditures) are not estimates of net benefits.

With this in mind, the sum of all of the expenditures estimated to have been spent on the Kenai Peninsula in 1998 is $15,722,892 (this is the sum of the "Fishing Kenai" and "Other Kenai" expenditure columns in Table 4.4.6). Impact scenarios were run in IMPLAN to produce response coefficients for each one of the expenditure categories in Table 4.4.6, based on the 1997 Kenai Peninsula economy. Response coefficients provide a measure of the total amount of output, income, and employment that is generated by $1 spent in any of the listed categories. In order to provide the extra dollar of commodity or service, the sector in question must now purchase more inputs from other sectors. These in turn will purchase more from other sectors in order to fulfill their new demand requirements, and several rounds of spending will take place in this fashion. Table 4.4.7 reports the response coefficients generated by the IMPLAN scenarios for each expenditure category. These are the sum of the direct, indirect, and induced effects for each category of expenditure that took place on the Kenai, and should not be confused with what is commonly called the ratio multiplier.

Neither the boat fuel nor the haul out and moorage fees appear in Table 4.7 because charterboat anglers do not directly pay out to these sectors. However, charter operators do, and the response coefficients for charter and guide fees reflect this. As anglers pay charter and guide fees, a portion of those monies are eventually spent on boat fuel and boat hauls or moorage, and these effects are captured under the impact scenarios run for charter operators. The derby sector is also missing from the list because an IMPLAN impact scenario has not yet been run for this sector, so the impacts reported below are preliminary estimates and represent a lower bound. Multiplying the response coefficients of Table 4.4.7 by the Kenai-only expenditures from Table 4.4.6 yields the economic contributions of halibut charter fishing in Cook Inlet to the Kenai Peninsula. These are enumerated in Table 4.4.8.

The values in Table 4.8 reflect the total impacts generated by the amounts spent in Table 4.4.6. For example, the $12,887,245 associated with the charter category is the sum of $8,363,134 spent on charter fees (Table 4.4.6) plus an additional $4,524,111 worth of goods and services that were generated as charter businesses purchased inputs for their operations. $5,237,798 worth of proprietary income and employee compensation resulted from the original $8,363,134 spent on charters, and 537 jobs were created. It should be noted that IMPLAN does not report job estimates on a full-time employment basis, so the value of 537 very likely includes a large number of seasonal and part-time jobs.

By referencing the "Totals" row in Table 4.4.8 we can surmise the total economic impact to the western Kenai Peninsula generated by the total $15,572,513 (not including derby fees) worth of angler expenditures: $22,560,637 worth of goods and services produced, $9,259,417 worth of personal income, and 738 jobs.

Table 4.4.6 Total estimated 1998 halibut charterboat expenditures for all residencies fishing in Cook Inlet off of the Kenai Peninsula.

	Days	Expenditures				
		Fishing (Kenai)	Other (Kenai)	Fishing (Alaska)	Other (Alaska)	Total
Days Fished	60,499					
Days spent on Kenai[1]	82,670					
Days spent in Alaska[2]	47,674					
Auto fuel			931,811		478,675	1,410,485
Auto/RV rentals			-		1,284,507	1,284,507
Lodging			1,681,660		940,930	2,622,590
Groceries			825,495		456,704	1,282,199
Restaurant & Bar			837,209		423,713	1,260,922
Charter		8,363,134				8,363,134
Gear		924,184		13,523		937,707
Processing		2,009,020				2,009,020
Derby		150,379				150,379
Boat Fuel		-				-
Haul/moorage		-				-
Total		11,446,717	4,276,175	13,523	3,584,528	19,320,943

[1] Includes days fished.

[2] Excludes days spent on Kenai

Table 4.4.7 IMPLAN generated response coefficients for 1997

	Response Coefficients		
Kenai expenditure categories	Total Output ($)	Total Income ($)	Total Personal Employment (Jobs)
Auto or Truck Fuel		1.481388	0.673183	0.000027
Charter & Guide Fees		1.540959	0.626296	0.000064
Fish Processing or Packaging		1.306554	0.495141	0.000028
Fishing Gear		1.369660	0.614428	0.000033
Groceries	1.400797	0.756778	0.000033	
Lodging	1.415863	0.532227	0.000024	
Restaurant & Bar		1.388998	0.524008	0.000032

4.4.4.2.3 Economic impacts of simulated changes in angler participation

To gauge the economic impacts of expected changes in fishery attributes on angler behavior, changes in angler day expenditures can be derived using the results from the participation rate simulations introduced earlier. Recall, for example, that varying the cost attribute simulates the effect of charter price increases or decreases on anglers' willingness to take a trip. The model reports the resulting probability increase or decrease in participation by residency, and this probability change can be applied on a one-to-one basis to angler expenditures. The change in expenditures is then fed into the recreational I/O model, which computes the impacts of altered spending on the local economy. Because input-output models are based on linear mathematical specifications of economic relationships that are more likely to be non-linear in form, it is not advisable to project changes that are very far from the mean. Hence, the simulations reported below are

constrained to affect less than a 25% change in the baseline expenditures, or less than a 25% change in the participation rate (to stay within reasonable limits of the participation rate model). Tables 4.4.9 and 4.4.10 show the projected changes in angler expenditures and resulting impacts to the western Kenai from changes in participation in response to decreases in expected catch and increases in the price of a trip, respectively.

The percentage changes applied to halibut catch and halibut price refer to how much the mean values for residents and non-residents are varied, beginning with the mean values for a halibut charter trip as reported earlier in Table 3.42. It would be useful, if time permitted, to translate these percentage changes to the discrete numbers of fish that prompt changes in angler participation for both residents and non-residents. Though it is easier to think of price changes in terms of small percentage increments, the model's continuous treatment of change does not lend itself very well to a conceptual interpretation of discrete changes in anticipated halibut catch. In other words, it is difficult to envision how a person would anticipate catching 1% less than his expected average of 3.61 total fish. For this reason, it is easier to begin with a more drastic reduction of 25% of expected catch.

The participation rate model cannot distinguish between kept and released fish at this time, and instead treats all values of catch as the total caught, including both fish harvested and fish released. This is a limitation if one wanted to strictly predict the impacts of reductions in fish that could be kept, as would be appropriate for modeling the effects of a bag limit. This information would also be required to place a per unit value on halibut that were kept. The value of recreational fish kept would more closely correspond to the ex-vessel values in the commercial fisheries. The results in Table 4.4.9 do not necessarily assume percentage changes in the amount kept, although to some extent this information can be teased from the data, time permitting. It is important to note, however, that the results do show an unambiguous response in angler behavior as expected total catch decreases, implying utility for the experience of catching a fish.

It should also be noted that these results come from our initial I/O runs and should be viewed as preliminary. In addition to projecting impacts, I/O multipliers can be decomposed to reveal the extent of inter-industry linkage among sectors of an economy. In other words, one sector's dependency on others can be gleaned from the numerous variables that form the multipliers. This can be particularly useful for describing the relative importance of recreational fishing to the area. Also, to be useful in a comparison with the impacts of commercial halibut fishing , a similar economic impact assessment is needed for the commercial sector, but this is not an option given time constraints. Moreover, similar models should be constructed for all regions within Areas 3A and 2C, but again, given the large scope of such a project and the associated high costs of groundtruthing, such a project would likely sacrifice some of the accuracy gained from focusing on a small area. It is also important to emphasis, again, that the 'value estimates' generated from net benefit analyses and those derived from impact analyses are not measuring equivalent things. Therefore it would be inappropriate to add the net benefit (economic welfare) measures in the earlier section with the I/O (economic activity) results described here.

Table 4.8 Estimated economic impacts generated by halibut charter angler expenditures in the western Kenai Peninsula in 1997

Kenai expenditure categories	Total Output ($)	Total Personal Income ($)	Total Employment (Jobs)
Auto or Truck Fuel	1,313,776	597,016	24
Charter & Guide Fees	12,887,245	5,237,798	537
Fish Processing or Packaging	2,624,892	994,749	56
Fishing Gear	1,265,817	567,844	31
Groceries	1,099,134	593,805	26
Lodging	2,262,718	850,563	38
Restaurant & Bar	1,107,054	417,643	25
Total	22,560,637	9,259,417	738

Table 4.4.9 Impacts to the western Kenai Peninsula of incremental changes in expected halibut catch for halibut charter trips

				Impacts		
% Change in halibut catch	% Change participation	Change in expenditures	% Change in expenditures	Output	Income	Employment
-5%	-1.7%	-365,053	-2.38%	-529,688	-213,967	-17
-10%	-4.3%	-862,118	-5.61%	-1,251,442	-505,747	-40
-15%	-7.7%	-1,500,766	-9.77%	-2,179,201	-880,996	-69
-20%	-12.1%	-2,290,297	-14.91%	-3,326,535	-1,345,229	-106
-25%	-17.6%	-3,237,330	-21.07%	-4,703,142	-1,902,402	-150

Table 4.4.10 Impacts to the western Kenai Peninsula of incremental changes in expected trip cost for halibut charter trips

				Impacts		
% Change in trip cost	% Change participation	Change in expenditures	% Change in expenditures	Output	Income	Employment
5%	-4.0%	-737,614	-4.80%	-1,071,587	-433,450	-34
10%	-8.2%	-1,509,285	-9.82%	-2,192,682	-886,939	-70
15%	-12.6%	-2,309,501	-15.03%	-3,355,292	-1,357,240	-107
20%	-17.1%	-3,132,049	-20.39%	-4,550,398	-1,840,709	-145
25%	-21.8%	-3,970,157	-25.84%	-5,768,172	-2,333,376	-184

4.5 Moratorium Alternatives

A moratorium on entry into the charterboat sector was proposed as one potential alternative for consideration in achieving the objectives outlined for this action, by the Council. However, as the following section demonstrates, a moratorium would not seem to have the capacity to achieve the programmatic objectives as defined for this action, but instead, (if adopted) would appear to be largely "*complementary to,*" rather than a "*substitute for*" a GHL program.

4.5.1 Introduction and Background

In the Council's original consideration of management alternatives, which resulted in the 1997 GHL decision, a moratorium on further entry in the charter fisheries was also considered. At that time however, data limitations precluded an initial determination of the number of truly active halibut charter operations. Salient points from that assessment include the following: (1) IPHC licenses for charter operations are low cost and easily obtained; (2) possession of a license is not necessarily an indicator of active participation in the fishery; (3) some active participants in the fishery may not have obtained the IPHC license, but may have other indicators of participation such as Alaska business licenses; (4) Coast Guard data on licenses are not computerized, nor are they specific to the activity of halibut fishing, or even chartering in general; and, (5) ADF&G guide registration files do not differentiate between halibut chartering and chartering for other species, such as salmon.

Given the likely number of qualifying vessels under any scenario, it was also unlikely that a moratorium would constrain the charter harvest; i.e., there was already an excess number of vessels (capacity) relative to the existing or projected demand for charter trips. For example, information from the 1997 study (conducted by ISER and Council staff) indicated that 1,998 IPHC licenses were issued in 1996, while the study also indicated that the entire 1995 charter catch could have been taken by 402 'six-pack' charter vessels, each operating at a 50% load factor (i.e., 75% of available days at 66% seat capacity). The number of IPHC licenses issued had grown from 1,481 in 1993; 1,679 in 1994; 1,926 in 1995; to 1,998 in 1996. These numbers may not be an accurate reflection of the actual growth of the charter industry, as some licenses were likely obtained (they are easy to obtain at no cost), but not necessarily fished, due to the Council's announcement of potential limited entry in 1993. A cross match of IPHC licenses for 1996 against ADF&G sport guide registration files resulted in a match of 1,117 vessels, still far greater than ADF&G estimates of between 500 and 650 'active' charter operations. The researchers at ISER, coincidentally, had estimated an active charter fleet of 518 vessels at the time of the 1997 study.

At the time of final action in 1997, the Council recognized that a logbook program was being developed by ADF&G for implementation in 1998 which would provide the kinds of information on participation which were heretofore lacking. Since 1997 the Council and its Halibut GHL Committee have been developing GHL management measures, alternative GHL trigger levels, and more specific alternatives for a potential moratorium on the charter fleet. Based on those discussions, and on the available information for the first full year from the logbook program in 1998, the following area-specific (2C/3A) moratorium alternatives have been identified for consideration. This discussion addresses Issue 5 of the restructured alternatives.

Moratorium Alternatives and Options

Years of participation

- Option 1: 1995, 1996, and 1997 IPHC licenses and 1998 logbook
- Option 2: 2 of 3 years (1995-97), plus 1998 logbook
- Option 3: 1 of 3 (1995-97), plus 1998 logbook
- Option 4: license or logbook in any one year (1995-98)

Owner vs Vessel

Option 1: owner/operator or lessee (the individual who has the license and fills out logbook) of the charter vessel/business that fished during the eligibility period (based on an individual's participation and not the vessel's activity)

Option 2: vessel

Evidence of participation

- mandatory:
  - IPHC license (for all years)
  - CFEC number (for all years)
  - 1998 logbook
- supplementary:
  - Alaska State business license
  - sportfish business registration
  - insurance for passenger for hire
  - ADF&G guide registration
  - enrollment in drug testing program (CFR 46)

Vessel upgrade

Option 1: license designation limited to 6-pack, if currently a 6-pack, and inspected vessel owner limited to current inspected certification (held at number of people, not vessel size)

Option 2: allow upgrades in Southeast Alaska (certified license can be transferred to similarly sized vessel)

Transfers

will be allowed

Duration for review

Option 1: tied to the duration of the GHL

Option 2: 3 years

Option 3: 5 years (3 years, with option to renew for 2 years)

The remaining sections of this chapter will summarize the currently available information regarding participation, outline associated decision points relative to the moratorium alternative, and discuss implications to the relevant user groups.

4.5.2 Recent Participation Levels and Patterns

The Council's alternatives for moratorium qualification are based on participation in the years 1995 through 1997, with three of the four alternatives requiring 1998 participation, as verified through the Saltwater Sportfishing Charter Vessel Logbook Program (SCVL). Chapter 3 contains information detailing recent harvest and participation levels by area, as well as projections for additional growth in the harvest by the charter fleet. Based on IPHC licenses, CFEC vessel registration files, and the SCVL (logbook) data, Table 4.5.1 below summarizes the total number of vessels and associated owners which would qualify under the four options considered.

Table 4.5.1. Number of qualifying vessels and businesses by IPHC area, under each of the options for an area wide moratorium

	Option 1		Option 2		Option 3		Option 4	
IPHC Area	Vessels	Owners	Vessels	Owners	Vessels	Owners	Vessels	Owners
2C	260	200	339	248	370	271	1,126	789
3A	237	206	294	257	324	285	947	780
Total	497	406	633	505	694	556	2,073	1,569

Source: 1998 SCVL database, 1995-98 CFEC vessel registration files, 1995-97 IPHC license database

The critical information to be drawn from this table is the huge difference in qualifying vessels (or owners) between Option 4 and the other three options. Option 4 allows qualification based on holding an IPHC license *or* logbook in any of the four years. The number of qualifiers (2,073 vessels) is very similar to the numbers we estimated in 1997 based simply on possession of an IPHC license. The other three options require some level of participation in 1995-1997, *and* the 1998 logbook, and qualifiers range from 497 under the most restrictive option to 694 under the least restrictive. These numbers are consistent with numbers from the 1997 study which estimated an active charter fleet of between 500 and 650 vessels statewide. These numbers also track much closer to the estimate of 402 'full-time' charter vessels, operating at 50% load factor, which were projected to be able to take the 1995 charter harvest.

Options 1 -3 consider current and past participation as qualification criteria. These numbers need to be considered in light of the actual number of current participants, as defined by participation in 1998. Logbook information from 1998 indicates there were actually 581 bottomfish participants in Area 2C and 504 in Area 3A, for a total of 1,085. The point to be made from this comparison is that any option which requires both 1998 logbook participation and some other year of participation will eliminate a substantial number of vessels which participated (as evidenced by logbooks) in 1998. Under the most restrictive option (Option 1) there would be 588 vessels eliminated, while the least restrictive option (Option 3) would eliminate 391 1998 participants. Option 4 is irrelevant to this comparison as it allows any year from 1995-1998 to qualify.

Preliminary logbook information for 1999 shows a slight increase in overall logbook participants - 588 in Area 2C and 520 in Area 3A, for a total of 1,108, with approximately (based again on preliminary data) 350 of the 1999 vessels showing up as unique to that year (175 in each area). This indicates considerable exit and entry in this fishery from 1998-1999. The 1999 logbook data has not been cross matched to any IPHC license data for 1995-1997.

The information compiled here is based on vessel participation from 1995-1998, and includes the associated current owners of those vessels. However, the information does not specifically track the participation of individual owners over that time period. The relationship between vessel participation and owner participation is a critical factor for the Council to consider, and will be critical to who actually receives permits to charter for halibut, and is discussed further in Section 4.5.3. Table 4.5.2 below contains further information on the qualifying vessels in each area, broken into size categories. The vast majority of vessels are '6-pack' licensed vessels, though some of the vessels in the larger size categories likely are not limited to 6 passengers.

Table 4.5.2. Number of qualifying vessels, by IPHC area and vessel length, under each of the options for an area wide moratorium

IPHC Area	Length	Option 1	Option 2	Option 3	Option 4
2C	<25'	71	98	110	439
	25'- 49'	177	226	244	625
	50'- 74'	10	12	13	51
	> 75'	2	3	3	11
2C Total		260	339	370	1,126
3A	<25'	60	76	86	378
	25'- 49'	158	198	218	514
	50'- 74'	18	19	19	51
	> 75'	1	1	1	4
3A Total		237	294	324	947
Grand Total		497	633	694	2,073

Source: 1998 SCVL database, 1995-98 CFEC vessel registration files, 1995-97 IPHC license database

Finally, Tables 4.5.3 and 4.5.4, below, provide the numbers of qualifying vessels, under each option, by vessel home port for Areas 2C and 3A respectively:

Table 4.5.3. Number of qualifying vessels by homeport for IPHC Area 2C

IPHC Area	Homeports	Option 1	Option 2	Option 3	Option 4
2C	ANCHORAGE		3	3	3
	ANGOON	3	4	4	24
	ASTORIA				1
	AUKE BAY	8	11	11	19
	BARANOF	1	3	3	4
	BELLINGHAM				2
	COFFMAN COVE	1	1	2	4
	CRAIG	18	27	29	72
	CRESCENT				1
	CUBE COVE				1
	EDNA BAY				7
	ELFIN COVE	7	10	11	24
	EXCURSION INLET				1
	FRIDAY HARBOR				1
	FUNTER BAY		2	2	2
	GLACIER BAY				1
	GUSTAVUS	11	11	11	27
	HAINES	2	2	3	11
	HOBART BAY				1
	HOLLIS				1
	HOMER	1	1	1	1
	HOONAH	3	3	4	15
	HOQUIAM	1	1	1	1
	HYDABURG				5
	IDAHO FALLS				1
	JUNEAU	37	47	52	229
	KAKE			1	11
	KETCHIKAN	50	58	62	204
	KILLISNOO	2	2	2	14
	KLAWOK	4	4	4	12
	KNUDSON COVE	1	1	1	1
	LEWISTON			1	1
	METLAKATLA				1
	MEYERS CHUCK				2
	MIAMI				1
	MINK BAY				4
	PELICAN	1	2	2	9
	PENNOCK ISLAND				1
	PETERSBURG	10	14	15	55
	PORT ALEXANDER				2
	PORT ALTHROP		1	1	1
	PORT ANGELES		1	1	1
	PORTLAND				1
	POULSBO	1	1	1	1
	PYBUS BAY		2	2	2
	SEAL BAY				2
	SEATTLE	4	7	7	8
	SHELTER ISLAND			1	2
	SITKA	51	70	76	198
	SKAGWAY	2	2	3	6
	POINT BAKER				1

Table 4.5.3 cont.					
	TACOMA	1	1	1	1
	TEE HARBOR				1
	TENAKEE	1	1	1	3
	THORNE BAY	6	6	6	11
	VASHON		1	1	1
	WARD COVE				1
	WATERFALL	5	8	8	29
	WEST PALM BEACH				1
	WHALE PASS	3	3	3	7
	WOOLDRIDGE			1	1
	WRANGELL	9	10	11	41
	YES BAY	1	1	4	9
	PORT PROTECTION	2	3	3	4
	WARM SPRINGS BAY				1
	UNKNOWN	13	14	14	15
2C Total		260	339	370	1,126

Source: 1998 SCVL database, 1995-98 CFEC vessel registration files, 1995-97 IPHC license database

Table 4.5.4. Number of qualifying vessels by homeport for IPHC Area 3A

IPHC Area	Homeports	Option 1	Option 2	Option 3	Option 4
3A	ALEKNAGIK				1
	AMOOK ISLAND				2
	ANCHOR POINT	10	13	14	33
	ANCHORAGE	8	10	10	53
	CHINITNA BAY				2
	CHUGIAK	1	2	2	5
	CLAM GULCH	1	1	1	4
	COOPER LANDING				3
	CORDOVA	4	4	4	29
	DEEP CREEK	1	4	4	13
	EAGLE RIVER	1	1	1	5
	FAIRBANKS	1	2	2	2
	FALSE PASS			1	1
	FERNDALE				1
	HALIBUT COVE				1
	HAPPY VALLEY	2	2	2	6
	HOMER	57	67	71	171
	ILIAMNA		1	1	1
	JUNEAU	18	20	21	22
	KACHEMAK				1
	KASILOF			2	17
	KENAI	11	14	16	54
	KODIAK	14	20	25	110
	LARSEN BAY				4
	NINILCHIK	24	32	33	74
	NORFOLK	1	1	1	1
	NORTH POLE	2	2	2	2
	OLD HARBOR	1	1	1	6
	OUZINKIE			1	2
	PALMER				3
	PORT LIONS	2	2	2	3
	PORTAGE				1
	SALCHA	1	1	1	1
	SEAL BAY			2	2
	SEATTLE		1	1	1
	SELDOVIA	2	3	4	12
	SEWARD	17	23	27	84
	SITKA	2	2	2	2
	SOLDOTNA	16	17	18	82
	STERLING	1	1	1	6
	TUTKA BAY	1	1	1	1
	UGAK BAY				2
	VALDEZ	20	26	28	62
	WASILLA	1	1	1	2
	WESTPORT	1	1	1	1
	WHITTIER	2	2	2	21
	YAKUTAT	6	8	9	25
	UNKNOWN	8	8	9	10
3A Total		237	294	324	947

Source: 1998 SCVL database, 1995-98 CFEC vessel registration files, 1995-97 IPHC license database

4.5.2.1 Notes and Assumptions Regarding these Data

For the years 1995 to 1997, proxies for participation rely on IPHC license and CFEC vessel registration data. IPHC licenses are issued for commercial, sport, or both types of operations. Designations of either sport or the "both" category suffice for evidence of participation so long as the vessel is registered for the same years with CFEC. While CFEC vessel registration is not specifically mentioned in the language delineating each of the four moratorium options, registration for each qualifying year effectively becomes part of the eligibility criteria since it is later introduced in the section under mandatory evidence of participation.

For 1998, actual participation can be determined to the extent that the SCVL accurately reflects the activity of all vessels that took part in the halibut charter fishery. Again, vessel registration with CFEC is also necessary for any documented participation in 1998 to be used as a qualifying element under the moratorium. Among the entries that make up the SCVL records are the amount of boat hours spent fishing for salmon versus bottomfish. In order for the logbook data to be used to qualify a vessel, this analysis assumes that more than 0 hours were expended in the pursuit of bottomfish during the 1998 season. Under this assumption, vessels that recorded exclusively fishing for salmon will not meet the qualification criteria for 1998 just because they appear in the logbook database.

To determine the IPHC area for which a vessel would qualify under an area-wide moratorium, the 1998 logbook data was first queried for each vessel's location of bottomfish activity. Some vessels that targeted bottomfish have no corresponding entry for area fished in the logbook data, and in these cases, their respective homeports as reported in the CFEC vessel registration files were assumed to reflect the location in which they traditionally operate. An IPHC area was assigned to these vessel's homeport accordingly. For example, vessels homeported in Homer or Valdez are assumed to participate in Area 3A. This process was also applied to vessels that did not participate in 1998 under the logbook data because there is no data that would otherwise indicate where fishing took place between 1995 and 1997. While this method can be reasonably expected to estimate the location of activity for vessels homeported in IPHC Areas 2C or 3A, it is likely to underestimate the total number of boats that have operated in those areas to the extent that vessels with some activity in 2C or 3A are homeported elsewhere. It is possible, for example, that a charterboat with a registered homeport that falls just within the boundary of IPHC Area 3B, may have operated predominantly in 3A. However, with no record of this activity, this charterboat would not be included under a moratorium specified by the current set of options. This example also helps explain the occasional occurrence of vessels homeported in locations that fall outside of 2C and 3A in the following tables, and in some cases homeports that show up in both 2C and 3A (Juneau, for example). Their inclusion under a 2C or 3A moratorium is based on 1998 logbook records, where locations in Southcentral or Southeast Alaska were entered for specific bottomfish trips.

Lastly, ADF&G staff set a logbook deadline date of January 17, 1999 for entering logbook trip information from charter operators into the 1998 logbook databases. Any logbook information received after this date was retained, but the data was not entered into the 1998 logbook databases. Staff received logbook information from 21 charter businesses and 21 vessels after the January 17 deadline, that had not previously submitted a logbook. These businesses and vessels would not meet the qualification criteria requiring 1998 logbooks (Options 1-3). These vessels are not included in the estimates provided above. The deadline for accepting and entering 1999 logbook data is January 15, 2000.

4.5.2.2 Additional Evidence of Participation

The numbers presented thus far are based on the best data sources available for identifying participation (IPHC licenses, CFEC registration, and the logbooks), and were identified by the Council as *mandatory*. However, the Council also identified *supplementary* information sources including: state business license,

sportfish business registration, insurance, ADF&G guide registration, and drug testing program enrollment. One interpretation of the two classes of evidence is that the second would only be used in cases where there were questions regarding qualification based on the first. Alternatively, there may be cases where a vessel (or person) is clearly ineligible based on the first set of criteria, but may be able to provide evidence of participation through the second set of criteria. The Council will need to be clear whether the second set of criteria is in addition to the first, or in lieu of the first through some application and appeals process. For example, in the IFQ program the Council allowed 1099 tax forms to be included as evidence of participation in the appeals process.

When the Council considered a moratorium for the charter fleet (halibut charter vessels) in 1997, a major obstacle in the path of implementation was determining who were the actual participants. Several sources of data existed, but none were refined enough to allow an analyst to determine who actually operated a halibut charter service during a year. The logbook system, implemented by ADF&G in 1998, should help clarify who actually participated in that year. As discussed earlier in this document, the State has expressed concern over using these data in the first year of the logbook program due to problems inherent in the first year of any data collection program. However, as the industry becomes more familiar with filling out these reports, the data quality will likely improve. This, of course, assumes that everyone in the industry is filling out the log book. ADF&G staff has expressed concern that, in their opinion, using the 1998 log books to verify participation may not be appropriate. They stated that before the log book system is used to determine who qualifies under a moratorium, additional checks on the data quality should be conducted.

The GHL Committee has by consensus recommended the option that would issue moratorium permits based on a person having held a 1995, 1996, and 1997 IPHC license and having filed a 1998 ADF&G logbook. Under this eligibility criteria, the person would need to have held an IPHC license in each year during 1995-97 and submitted a 1998 ADF&G logbook, which reports halibut landings, to ADF&G during any week in 1998 to qualify for a permit. The Committee's intent was to issue the permit to a person based on his/her participation, and not vessel activity. IPHC licenses are issued to vessels and are easily trackable by ADF&G number. Licenses are also signed by the captain and/or owner of the vessel, but no unique person identifier is included on the form (e.g., SSN) other than the signature. Therefore, it would be more difficult to match persons (owners) on IPHC licenses and ADF&G logbooks than vessels. Still, matching the names from the two data sets is probably possible, though it will likely require more time to check the data and will result in a greater possibility for error. This would not preclude the Council from choosing the option to base eligibility on a person's participation; as discussed further in Section 4.5.3, the number of total permits will likely be similar to what is shown in Table 4.5.1.

The GHL Committee divided the evidence required for qualification into two categories, as is reflected in the current suite of options. The first category included the information that would be required for proof of qualification. These data included information from the IPHC license, CFEC permit files for sport charter vessels, and the 1998 ADF&G Saltwater Charter Logbook. Data that could be used to supplement the mandatory information could be derived from Alaska State business license files, sportfish business registration files, records of passenger for hire insurance, ADF&G guide registration files, and proof of enrollment in a drug testing program as is required under CFR 46. It is likely that the supplemental information would only be used in cases where there is doubt about a person's eligibility after reviewing the mandatory data sources, though clarification by the Council will determine the proper application of the supplementary information.

The IPHC dropped the requirement that halibut sport charter vessel owners, operating in Alaska, apply for an IPHC license in 1998. The reason IPHC made this change was because the Commercial Fisheries Entry Commission (CFEC) implemented a sport charter vessel permit program in 1998, and the IPHC did not want to require vessel owners to file duplicate reports to the two separate agencies. Instead the IPHC plans to use

the CFEC permit information and the ADF&G logbook information to fill their information needs. The IPHC had discussed continuing licensing sport charter vessels for one more year in order to have a cross check between IPHC and CFEC files. Due to the time involved in issuing the permits and the limitations in knowing whether the IPHC license was active, the IPHC opted to discontinue licensing vessels in 1998.

4.5.3 Associated Decision Points

Vessel vs Operator

A primary decision associated with the moratorium alternative is whether qualification would be based on the activity of a *vessel,* as opposed to the activity of the *operator* of that vessel. Pursuant to that decision is whether the moratorium permit would be vessel-specific, or person-specific. The IPHC licenses vessels, and each license application lists the name of the vessel's owner and the name of the captain(s) if they are different. The application contains blanks for two captains' names and addresses.

The following example, borrowed from the 1997 Council analysis, may illustrate the importance of the distinction between issuing the permit based on the person's versus the vessel's history: Hank operates the 'six-pack' vessel "Butkicker" in the charter fishery from 1995 through 1997, but then purchases a larger, more modern vessel - the "Barndoor" - in 1998 and fishes that vessel in 1998 under the logbook program. The Council chooses an option requiring 1998 participation, based on a vessel's participation history. Hank's new boat does not qualify; meanwhile Ted Timing, who never fished prior to purchasing the "Butkicker" from Hank, did make a trip or two in 1998 using the logbook, and finds himself with a moratorium qualified vessel. This approach was used in the Council's groundfish license limitation program; i.e, qualification was based on a vessel's history, but the permit was issued to the owner as of June 1995, the date of the Council's decision. In that case, transfers up to that date were to be recognized in the permit issuance process (if a valid contract exists), and the fisheries were already operating under a moratorium where transfers of vessels typically included explicit disposition of catch histories. If the permit was issued to the person making the landings, then Hank would have been issued the permit to continue his charter operation, while Ted would not receive a permit.

If the allocation is made to persons the issue may also become complicated. For example, Tom is the owner of a lodge that specializes in halibut charters. As the popularity of Tom's lodge grew, he hired skippers to run the charterboats for his lodge. He continued running the lodge, booking the charters, and transacting all the business dealings for the charters. He then hired five friends to use his boats to take his clients fishing. His friends basically served as Tom's captains. However, they were required to get the IPHC licenses for their specific boat and keep it in good repair. They were then paid a flat rate by Tom for each trip plus all the tips from the clients. This arrangement has worked well for all involved since 1995. The Council then decided to issue permits to the vessel's current owner. Tom receives five charter licenses and the captains must continue working for Tom or they cannot charter for halibut. If the permit was issued to the persons actually applying for and fishing the IPHC licenses, then Tom would not be issued any charter licenses for his lodge, and would need to contract with his former captains. However, his former captains would have the option of taking their permit and applying it to another lodge owner's boat who is willing to pay more. If Tom had contracted with persons who owned their boats, he would not receive a permit under either scenario. If the people he contracted with then left his lodge to start their own business, he would need to hire other captains with their own permits or purchase permits for himself.

The approach outlined in the Council's alternatives would issue permits to owners/operators (or leaseholders), and restrict the number of vessels which may be used under that permit, but not make the permit specific to any particular vessel. Under this approach, each vessel within a given operator's fleet would still have to carry some type of proof of qualification, for enforcement purposes. Because the IPHC

licenses vessels by owner and captain, it is possible the Council would consider licensing vessels based on a person's history. This approach would allow conflicts arising from vessel sales to be minimized. A permit would be based on a person's fishing history and not that of the vessel he currently owns, however when he applies to the CFEC for his permit he would indicate the boat on which he will be fishing the permit. This approach issues the permit to owners/operators, and restricts the number of vessels which may be used under that permit, but does not make the permit specific to any particular vessel. Each vessel within a given operator's fleet would still be required to carry some type of proof of qualification, for enforcement purposes. The main area of resolution for the application and appeals process would be identification of lease situations.

Because the analysis of options is based on vessel activity, as opposed to owner activity, the numbers provided could be a slight over or under-estimate relative to what would actually be issued if the Council decides that owner activity is the proper criteria; however, because a vessel still has to satisfy the eligibility criteria in each case, it is likely that the overall numbers shown (of vessels) are a close approximation of the number of permits which would be issued. Making this decision does not eliminate all of the complexity with regard to permit issuance. It was the committee's intent that permits be issued to persons and not vessels. They then defined person as the business owner or lease holder. While it may be more difficult to track persons across different data sets, it does reduce the problems associated with people using different vessels at various times during the qualifying period. For example, the transfers of fishing history would not be an issue if a vessel is bought or sold. The problems associated with when a person should be issued a license are numerous, but they can be overcome. Recall that the IPHC license has a field for the name of the vessel, the ADF&G vessel number, Coast Guard documentation number, the vessel owner's name, the captain's name, and the license type (sport only or both sport and commercial). The only field that has information in every observation is the license type. The other fields are blank some of the time. A few examples will illustrate some of the problems encountered after briefly studying the 1995, 1996, and 1997 IPHC license files.

1) In one case Fred Smith is listed as the captain on five IPHC vessel licenses during 1995 and 1996, but in 1997 is not listed as the captain on any licenses. During 1997 Kim Smith is listed as the captain of the same five vessels that Fred Smith captained during 1995 and 1996, but did not hold a license in either 1995 or 1996. No owner was listed on the IPHC license for any of these five vessels. The question is, should any licenses be issued if the requirement is that a person held an IPHC license each year between 1995 and 1997?

2) Toney Z. Smith was listed as the owner of a vessel in the IPHC license file during 1995, but not 1996 or 1997. However, a Tony Z. Smith was listed as the owner of the same vessel during 1996 and 1997, but not 1995. It is likely that this is the same person and he should be given credit for holding a license each year. Interestingly, Peter F. Smith is listed as the captain of Tony's boat each year. Peter is also listed as the owner of four other vessels (each year between 1995 and 1997). So according to IPHC files, Peter was the captain of Tony's boat and owned four boats of his own. So, Tony may qualify for one license and Peter, four.

3) Kelly Smith is listed in the IPHC vessel files as a vessel owner and captain in 1995 and 1996. In 1997 she is only listed as a captain. William Jones is listed as the owner in 1997. Should Kelly be issued a license based on participation in each year?

Other grey areas, in terms of who should be issued a permit, may be encountered. These situations will have to be resolved as part of an application and appeals process. The supplementary information listed in the options may assist in clarifying ownership and participation histories.

Transfers

Any limited entry program will require allowances for transfers of permits. The recommendation of the Halibut Charter Work Group was to allow transfers of vessels with or without the associated moratorium permit. This is similar to the way the current groundfish and crab moratorium works, and similar to how the license limitation program will work once implemented. Such transfers would be subject to the upgrade restrictions discussed below. In the case of the charterboat fishery, two types of transfers may need to be accommodated: (1) transfers in the traditional sense - from one owner/operator to another, and (2) 'temporary' transfers of the permit from one vessel to another in the event of vessel breakdowns, for example. This type of transfer would be unnecessary if the permits are owner-specific, as opposed to vessel-specific.

Moratorium vs Licenses

By some definitions, a moratorium is a temporary 'time-out' management measure, often used as a precursor to further management measures, including additional limited entry alternatives. In considering a moratorium on new entry to the charter fleet, the Council needs to determine the appropriate duration of the moratorium, which is at least somewhat dependent upon future management intent. A long-term, or indefinite, moratorium is in effect a license limitation program. The information in this analysis indicates that any moratorium on this industry may qualify more vessels than are currently 'active,' and likely more than are necessary to accommodate client demand. This information supports the idea of a long-term moratorium, i.e., a license limitation program.

Moratorium/License Program Duration

The Halibut Charter Working Group recommended that any moratorium should be equal in duration to the GHL. A short-term moratorium may be useful in providing a time window for the Council, and other management agencies, to develop more specific management programs geared toward specific regional concerns. However, a short-term moratorium would not likely restrain growth (catch) by the charter fleet, but it may serve other management objectives such as providing a more stable business environment for the charter fleet. The GHL Committee, by consensus, recommended the option of keeping the moratorium in place as long as the GHL remains in effect. If the Council chooses this option, the moratorium and GHL would be permanent, and would require further Council action to amend the program before the moratorium would cease. It also means that the Council would need to take action to keep the moratorium, if they decide to drop the GHL in the future. Other options recommended by the Committee were to sunset the moratorium after three or five years (three years, with an option to renew it for two additional years). These options would allow new entry even if the fishery were still operating under the GHL.

If the Council selects a license limitation program as the vehicle to limit entry into the charter fishery for halibut, then the number of licenses issued and to whom they are issued become even more critical than under a moratorium. The Council's approach under the groundfish moratorium and license programs was to be more lenient under the moratorium, in terms of requirements to earn a moratorium permit, and then require additional qualification criteria under that license program. The addition of license qualification requirements continues to reduce the numbers of eligible vessels.

Vessel Upgrades

Vessel upgrades considered by the committee dealt with the number of passengers that could be carried by a vessel. It was the consensus of the committee that the permits would be limited to six clients per vessel (except perhaps for existing vessels which are licensed for more than 6 passengers). The other option listed

that was identified by the committee was to allow (grandfather) larger vessels from Southeast Alaska that are *currently* limited to six-pack licenses to upgrade and carry more than six clients at a time. By limiting the number of passengers a charter could carry, upgrade restrictions like those placed on the commercial fisheries may not be needed. Recall that under the groundfish and crab moratorium there is a limit on vessel length increases (20% LOA). Other limits on increasing the vessel's horsepower or changing gear were also considered for the commercial fishery, but may not make as much sense in the context of charter fisheries.

The overwhelming majority of vessels in the charter fleet are 'sixpack' vessels which may take up to six persons per trip. The 'sixpack' designation would serve as an effective limitation relative to the issue of vessel replacement and upgrades - as long as the permits are still restricted to vessels which may carry a maximum of six passengers per trip, with each person limited to two fish. A six-line limit and a limit on lines to the number of paying passengers are further restricting charter harvest in Southeast Alaska.

There are some vessels in the fishery which are not restricted to the 'sixpack' license, and are operated by persons with, for example, 100 ton Master's Licenses. There may be little practical value in attempting to limit upgrades by these larger vessels, assuming that they are not likely to carry more than 20 passengers per trip under any circumstances.

Other provisions

Several other provisions were also considered as part of a moratorium. These included the concept of requiring a minimum number of days fished or a minimum number of pounds of halibut caught to qualify for a permit. This concept was rejected by the committee because they felt it would be difficult to separate salmon from halibut effort. However, the ADF&G logbooks break out effort, harvest, area fished for bottomfish (halibut) and salmon, and will allow analysts to determine if a skipper fished for halibut on any given charter trip and where fish were caught. The logbooks list the number of days that halibut were caught on a charter. This does not necessarily mean the entire trip targeted halibut, it would only prove that halibut were caught. It is also possible that a charter could have gone fishing with the intent of targeting halibut, but did not record any landings. That trip would not likely count towards qualification. Yet with some simplifying assumptions about what constituted a halibut trip in 1998, it may be possible to determine if the minimum number of days fished or the minimum number of halibut needed for qualification were harvested.

Linking a guaranteed season length to the moratorium was also considered by the committee. This means that if a moratorium is put in place, a definition of the fishing season would also be needed. This was also the Council's intent under the GHL. The Council stated when they passed the GHL that they did not intend to shorten season lengths. Its intent was to slow the pace of the fishery through other, yet undefined, management measures and to maintain a fishery of traditional length.

The concept of a rod permit and a sportfish reserve were also considered as part of the moratorium. Both of those concepts have been discussed elsewhere in Section 4 and will not be discussed further here.

4.5.4 LAMPS vs Area-wide Moratorium

Summary of LAMP status and affected communities

An important consideration with regard to a possible moratorium option is the relationship to the ongoing development of local area management plans (LAMPS), which are a new management tool being used by the Council and Board of Fish to resolve local area user conflicts. The LAMP concept originated due to halibut resource user conflicts in Sitka Sound, and are now being developed in several other areas, primarily

to address halibut management issues. Several of the proposed LAMPs contain local area moratoriums as a sole solution to user conflicts or within the suite of management measures.

In February 1998 the Board and Council adopted a joint protocol to guide the successful development, processing, and implementation of LAMPs. Though the protocol covers development of LAMPs for all species of interest in a local area, the Council's main purview will be over halibut and those species covered by its fishery management plans. The Board's main purview will be over all state-managed species.

The Board and Council agreed that the following process would be followed for developing and adopting all LAMPs.

1. Agency staffs would work together to develop information needed for the Board to make a decision. This would include economic, biological impact information, as well as legal guidance.

2. A joint Board/Council committee will meet to review the proposal and supporting information.

3. This joint Board/Council committee reports to the Council and the Council develops preliminary comments for its next Council meeting.

4. During a scheduled Board meeting, the Board will consider the LAMP proposal, public, agency, and Council comments and testimony, and deliberates on the proposal. If the LAMP proponents have successfully resolved all outstanding issues the Board could take final action. However, if major issues remain unresolved, the Board will send the proposal back to its committee for further work.

5. Once the Board adopts the LAMP proposal, it is sent to the Council along with available analyses and resolution of any legal issues. The Council will further develop the analysis and then send it out for public review.

6. The Council schedules final action on the proposed LAMP. The final plan would then be submitted to NMFS for review and approval of the halibut portion of the LAMP.

7. The final LAMP is approved by NMFS and implemented as soon as possible.

A LAMP developed for Sitka by a task force of concerned representatives of the various halibut user groups is the first successful example of this co-management approach. The problems in the fisheries were first identified in 1993. Community discussions between then and 1998 resulted in a successful proposal that was approved by the Board and finally by the Council in 1998. NMFS implemented the Sitka LAMP on October 29, 1999.

The Board received the first LAMP proposal under the joint protocol in April 1998 from groups in the Cook Inlet and Kodiak Island areas. ADF&G staff provided harvest and effort data as well as guidance and advice on the potential impacts of local halibut management plans on state-managed fisheries. ADF&G staff have attended at least eight advisory committee meetings in Ninilchik, Homer, Kodiak, Valdez, and Seward.

The first LAMP proposals were considered by the Board at the lower Cook Inlet meeting in November 1998, the Kodiak meeting in January 1999, and the Upper Cook Inlet meeting in March 1999. The Board recognized at the Lower Cook Inlet meeting that the proposals under consideration did not meet the protocol requirements at that time. Specifically, the proposals did not have the consensus of representatives of all affected user groups, and there were conflicts, or overlap, of proposed LAMP areas by groups in Kodiak and Cook Inlet. The Board decided at the Lower Cook Inlet meeting to establish a task force to resolve the

problems identified in the first LAMP proposals. The Board heard testimony at the Lower Cook Inlet, Upper Cook Inlet, and Kodiak meetings and deferred action on all LAMP proposals until the task force was appointed.

At its October 1999 work session, the Board discussed LAMP planning and the status of tabled LAMP proposals. The Board charged the Halibut LAMP task force to define or identify the problem and the need for a LAMP and then establish geographic boundaries for conflicting LAMP proposals. The first meeting of this task force was held concurrent with the December 1999 Council meeting in Anchorage. The task force convened again in March and reported its progress to the Board, which deferred any action until fall.

It is anticipated that once the Council has taken final action on the GHL/moratorium issue and the task force has completed work on the geographic area definitions, the task force will be broken into separate entities. These task forces, defined by area, will then be charged with developing LAMPs for those areas. All of the LAMP proposals that have been submitted to the Board to date are listed below.

- Implement a moratorium on new entries to the halibut charter industry in Upper and Lower Cook Inlet for three years. Submitted by the Deep Creek Charterboat Association.

- Allow only 12 halibut per 24-hour day for six-pack charters who launch and load from Ninilchik to Anchor River. Submitted by Doug Blossom Jr.

- Provide that recreational halibut anglers shall not anchor their vessels at times or in areas open to the salmon drift fishery when drift vessels are present and engaged in fishing. Submitted by the United Cook Inlet Drift Association.

- Implement a moratorium on new entry into the halibut charter or guide service business in the waters of Cook Inlet and Kachemak Bay for a period of three years. Submitted by the Homer Charter Association.

- Define a separate halibut management area for Kodiak similar to the Kodiak Salmon Management Area. Submitted by the Kodiak Advisory Committee.

- Direct the development of six sub-area plans within the larger Kodiak Management Area. Submitted by the Kodiak Native Tourism Association.

- Establish sport fishing-only areas in Prince William Sound for halibut effective May 15 to September 15. Submitted by the Valdez Advisory Committee.

- Establish sport fishing-only areas in Prince William Sound for halibut effective May 15 to September 15. Submitted by David Pinquoch.

- Allow IFQ halibut fishing in Prince William Sound only from March 15 through May 15 and from September 15 through November 15. Submitted by the Valdez and Seward Charterboat Associations.

- Establish Prince William Sound as a super-exclusive registration area for commercial and charter halibut fishers. Submitted by the Valdez Advisory Committee.

- Establish a Seward Area as a super-exclusive registration area for the halibut charter fishery. Submitted by the Valdez and Seward Charterboat Associations.

Establish sport fishing-only areas for halibut off Cape Cleare and Cape Puget effective May 15 to September 15. Submitted by the Valdez and Seward Charterboat Associations.

- Prohibit commercial fishing for halibut within three miles of land. Submitted by the Alaska Sportfishing Association.

- Establish a halibut management plan for the Yakutat area. Submitted by the Yakutat Advisory Committee.

LAMPs have the potential for resolving local user conflicts and may be used to incorporate other management measures on a local basis. However, usefulness of a LAMP to maintain harvests under a GHL for an entire IPHC regulatory area may be limited unless there is significant coordination among other LAMPs within the same IPHC regulatory area. Implementing LAMPs requires significant monitoring and enforcement costs, but LAMPs do have the advantage of heightened local attention, especially if the LAMP was developed through community consensus.

Relationship to area-wide moratorium

The Council is considering a charter vessel moratorium for IPHC Areas 2C and 3A. The LAMP process to resolve user conflicts in communities is a separate and ongoing management activity by the Board. Some of the LAMPs that are currently under development also include a moratorium. It is possible that if both the area-wide and LAMP moratorium were put into regulation, they would conflict. If there are conflicts, a plan will need to be developed that defines which moratorium would take precedence over the other. For example, if the qualification requirements differ and the Deep Creek LAMP moratorium is more restrictive than an area-wide moratorium, what would happen? Would only those persons that qualify under the LAMP be allowed to fish in the Deep Creek area, or would any one with a state permit be allowed to fish? If the area-wide moratorium has precedence what is the purpose of a LAMP moratorium? If the LAMP moratorium took precedence, would the area-wide permit holders that did not qualify under the LAMP be forced to fish only areas outside the LAMP, such as Old Harbor, and would this negate the goal of the Old Harbor LAMP? If the intent of the Old Harbor LAMP is to allow its residents to enter the charter fishery and benefit from increasing tourism in the area, then limiting the participants in the Old Harbor area to those that already hold an area-wide permit would do Old Harbor residents little good.

On the other hand, if an area-wide permit was more restrictive, could a person that qualified under a LAMP in Old Harbor fish within the local area but not outside? Or, would the permit holder that qualified for the local plan, but not the area-wide plan, not be allowed to fish anywhere covered under the larger moratorium? The issue of which moratorium will take precedence over the other and how the moratoria would mesh together will need to be resolved before they are developed for both LAMPs and IPHC areas.

Problems that could arise if local and area-wide moratoria did not mesh well together go beyond who could fish in a given area. It also applies to all other aspects of the moratorium's structure. One moratorium could sunset after a given number of years and the other could be permanent. One moratorium could allow permit transfers and the other may not allow transfers. A permit for a larger vessel may allow the boat to carry more than six passengers under one moratorium but not the other. The hierarchy of which moratorium would take precedence over the other needs to be clearly established prior to implementation, or only one type of moratorium should be selected.

ADF&G staff has indicated that the State would not support a moratorium for the 2C and 3A areas, whether the areas are combined or separated. ADF&G staff noted that there is currently no State constitutional authority for any form of limitation system or moratorium on recreational anglers, including the charter fleet.

Thus, any proposed moratorium the Council implements for halibut must take into account the ripple effects on other species that would be targeted by the charter fleet, such as increased participation in salmon charter fisheries. That concern, along with the concern that charter operations and facilities are in very different stages of development in areas across the State, may compel the State to oppose any form of state-wide or area-wide moratorium or license limitation system. The State could support a moratorium or license limitation system on a local level (as a LAMP component), given sufficient justification.

ADF&G staff has indicated they would prefer to develop and implement any charter moratorium through LAMPs which are reviewed by the Board as well as the Council. This would allow the impacts on species other than halibut to be considered by the Board before any regulations were passed on to the U.S. Secretary of Commerce. Staff also stated that the diversity in the charter fisheries could best be dealt with at the local level, as a one-size-fits-all approach might not be the best solution.

4.5.5 Impacts to Affected User Groups

A moratorium could be expected to directly or indirectly impact several segments of the fishery. The charter fleet itself could be impacted in two ways. First, by establishing who receives permits to continue participating in this industry, and who does not, a moratorium could impact competition and the overall business climate of the industry. Secondly, a moratorium could affect the likelihood of attaining a given GHL, and therefore affect the likelihood of additional management measures being implemented to constrain overall harvest. Fishermen (charter clients), and related support industries, could be indirectly affected in a similar manner, related to either the availability (and cost) of a charter or the regulations imposed on them through additional management measures. The commercial sector would be effected only to the extent that a moratorium constrains the harvest and helps the charter fleet operate within the GHL. Other fisheries, particularly alternative sport fisheries like salmon, could be impacted to the extent a moratorium creates additional effort in those fisheries.

4.5.6 Moratorium as a GHL tool

The purpose of the GHL is to provide a benchmark, the attainment of which may result in additional management measures in a subsequent year designed to maintain the charter fleet harvest within that benchmark. A fundamental question is whether a moratorium, either alone or in combination with other measures, would constrain the capacity of the fleet at or below that GHL. Obviously the answer to that question depends on several key factors, including (1) the level at which the GHL is set; (2) the expected biomass of halibut in future years; (3) the expected harvest by the charter fleet (which is a function of client demand rather than numbers of boats or available quota); and, (4) the latent capacity of the qualified charter fleet. This latter factor is important in that, regardless of halibut biomass levels or the GHL level, a moratorium by definition would only be constraining on harvest *after* the latent capacity of the qualified fleet is filled.

Even if a moratorium limited the number of vessels to the currently active fleet (there were 1,085 logbook participants in 1998), or to a number lower than that, but the qualified vessels were operating at less than full capacity, then the annual harvest could increase. For example, let us assume that on average the charter fleet operates 5 days a week and carries an average of 5 clients per trip. In this example the fleet average would be 25 clients per week. However, if vessels are allowed to carry 6 clients and can operate 6 days a week, they could actually serve 36 clients in a week. The growth from 25 to 36 clients per week is a 44% increase. Depending on where the GHL is set, it is likely (at least under this scenario) that the latent capacity of the active charter fleet could allow the GHL to be exceeded. This assumes that catch rates per client, the size of halibut caught, and the season lengths remain constant. However, if there is a large increase in client demand

for halibut charter trips under a moratorium (i.e., there is no more latent capacity), then limiting the number of vessels will keep new guides from entering the fishery and may slow the rate at which catch increases.

If the number of vessels were limited by a moratorium, then the maximum pounds of halibut that could be taken is constrained by the size of halibut harvested, the number of clients a vessel could service in a day (maximum number of clients per trip times the number of trips per day), and the number of days a vessel could operate during the year. The activities that increase harvesting capacity (outside of the number of operations), could be controlled with or without implementing a moratorium. However, limiting the number of passengers a vessel could carry without limiting the number of vessels may not be effective in keeping the fleet from reaching its GHL.

It is also true that, if the GHL is set at a level that is at or near the level already being taken (regardless of latent capacity), then a moratorium would have no effect in maintaining harvest below the GHL. The halibut biomass itself will be the other important factor in determining if the charter fishermen will reach the GHL in a year. For example, if a GHL is a floating cap based on some percentage, and the biomass declines in the future from its current all-time highs, then a moratorium would likely be moot in terms of constraining harvest below that GHL. Only if the GHL is set at a level which allows room for growth, and the biomass stays close to current levels, could a moratorium be expected to be effective in constraining the fleet below the GHL. If the quota declines significantly when compared to currently high levels, then the charter fishery may very well exceed its GHL even if its sector has not experienced any growth in terms of actual pounds harvested.

Under this scenario, limiting the number of vessels that can participate in the fishery will provide the fleet little protection against reaching the GHL, because the catching capacity (either vessels or owners) needed to harvest the GHL will likely qualify under any moratorium scenario. However, given the estimated number of qualifying vessels under the most restrictive alternative (Option 1), it is possible that this moratorium option would be effective relative to the GHL, again assuming no increase in the load factor (currently estimated at 50% overall) of those vessels. Whether that load factor increases will be a factor of client demand. Given that Option 1 would eliminate a substantial number of currently active vessels (based on 1998 logbook information), it seems reasonable to assume some increase in load factor for the remaining, qualified vessels.

Recall that in its 1997 study, ISER projected the allocation of halibut under three moratorium levels based on estimated fleet capacity at each of those levels--vessels licensed for halibut (1,998), charters taking halibut (1,096), and the active halibut charter fleet (518). A moratorium based on all currently licensed vessels was projected to license enough harvest capacity so that the charter harvest would not be constrained through 2008. A moratorium based on the estimated harvest capacity of the charters currently taking halibut would not become effective until 2003, assuming the load factor per vessel did not increase above the level of the currently active fleet (under the base "Revised TAC" case and the LOWER growth rate of the guided harvest.) A moratorium based on the currently active fleet (518) would have been immediately constraining, again assuming no increase in the load factor per vessel above the currently observed level.

The moratorium options currently being considered, with the possible exception of Option 1, are likely to qualify more vessels than are necessary to take the available GHL, even under GHL options which allow increased harvest relative to current levels, particularly given the likelihood that halibut biomass will decline from its current high levels. A GHL fixed range, rather than a floating percentage, may make a moratorium option more effective, assuming that the range is at a level well above the current fleet capacity.

4.5.6.1 Specific user group impacts

Charter fleet

As discussed above, the most restrictive moratorium options may have the ability to help the charter fleet remain within a GHL, while less restrictive options will not likely have any affect relative to the GHL. There are other potentially significant effects of a moratorium which do not relate to the GHL. Two anticipated effects of an *effective* moratorium would be a shift towards more full-time operations, and an increase in the price of a charter. Some of the underutilized fleet consists of vessels that are only used part of the season or on certain days of the week. As growth in charter demand pressed upon the limits of the fleet, part-time operators would tend to become full-time operators either as they took on more clients, or transferred their right to participate to a full-time operator. This scenario assumes that the qualified fleet would increase its load factor, and/or that the demand for halibut trips would increase to fill the available supply.

If that demand increased to such a level, the charter price would tend to rise to ration the demand across the available supply of boats. Unlike the case of a quota where additional boats could enter the market during times of heaviest demand and keep the price from rising, under a moratorium that limited the number of vessels, the higher price could not be driven back down by additional competition. There would, however, be some competition among the existing boats which could cause an increase in the cost of operations as operators vied with one another to offer the best services and accommodations to capture the largest share of the market. The likelihood of increased demand could be offset by other management measures being considered, such as reduced bag limits which may affect the consumer's willingness to pay for a charter trip. A final impact relates to reduced competition and an increased operational stability for those charter vessels which remain in the fishery. This increased stability should be evaluated in the context of a moratorium's ability to address the other factors identified in the Council's Problem Statement.

Charter clients

Among the comments from the Council's SSC was the explicit desire to evaluate trade-offs between charter operators and charter clients which may arise under a moratorium. The most obvious impact to charter clients, as discussed above, would be the ability to procure a charter trip, and the associated price of that trip, which will depend on the extent to which a moratorium is effective . If the moratorium is effective (constraining for the GHL purposes), that in and of itself would not necessarily impact availability of charters (and price) because a GHL would not shut down the charter fishery (ignoring for the moment the effects of other GHL management measures on trip demand). However, if a moratorium is constraining on the available demand for trips, and there are not enough charter trips available to meet that demand, it will have the potential to impact clients in terms of price increases for trips. In that sense, increased benefits to the charter fleet which may result from a moratorium could be at the expense of charter clients.

Commercial fishery

The impacts to the commercial fishery of a moratorium could be positive, assuming that a moratorium was effective in terms of keeping the charter fishery below its GHL. If other measures, reduced line or bag limits for example, were effective relative to the GHL, then there are no additional benefits from a moratorium. It is possible that a moratorium in conjunction with other measures could help constrain the charter fleet below the GHL, depending on the qualification criteria chosen (number of qualified charter operations), the GHL level chosen, and the future halibut biomass. It appears likely that only the most restrictive moratorium options would allow for such benefits to be realized.

Other fisheries

One of the concerns State managers have expressed relative to the area-wide moratorium option are the potential impacts to other, already crowded charter fisheries. A limit on the number of halibut charter vessel permits would leave few alternatives for new entrants, other than salmon sport fish guiding services or eco-tourism based charters.

The impacts of a GHL on state-managed species, including salmon, lingcod, rockfish, and other freshwater species will vary by local area, by the severity of the GHL, and by the reaction of potential guided anglers to a GHL. In areas where there are only a few charter vessels operating or where existing charter vessels catch limited numbers of halibut there would probably be very little if any impact on other state-managed species. However, impacts on other species could be significant in local areas with large, active charter fleets that do harvest large numbers of halibut.

The level of impact on state-managed species would depend on how many potential charter clients decided not to fish at all due to the GHL and how many decided to fish anyway, but for other species. Approximately 80% of all angling effort in Area 2C currently occurs in saltwater. Many charter operators offer multi-species fishing trips thus giving them clear opportunity to shift their client's fishing effort from halibut to other marine species.

The sport fishery in Area 2C has a specific allocation of king salmon from the Board. ADF&G monitors the sport harvest in-season with a comprehensive creel survey and port sampling program. Under the provisions of the King Salmon Management Plan, the sport harvest is reduced when the total harvest is projected to exceed this allocation. If a GHL caused charter vessels to target king salmon to a higher degree than under current conditions the king salmon harvest could increase and harvest restrictions would need to be imposed on all sport sectors earlier in the summer fishing season.

Other species of salmon, as well as rockfish and lingcod stocks would be impacted if charter operators increased their fishing effort on these stocks in response to a GHL on halibut. ADF&G has expressed conservation concerns for lingcod and rockfish stocks in most areas of Southeast Alaska. Based on these concerns the Board has adopted very restrictive regulations for yelloweye rockfish in the Sitka and Ketchikan areas and for lingcod in the Sitka area. Increased exploitation by the guided sector due to a GHL would add to these conservation concerns.

Another potential impact of a GHL in Area 2C could be a shift in guided fishing effort from marine waters to freshwater systems. If charter and lodge businesses started offering freshwater fishing opportunities to compensate for a GHL, guided effort and harvest would increase dramatically for freshwater species. There are thousands of small freshwater drainages in Area 2C that produce relatively small numbers of adult salmon each year. Major increases in harvest in these systems would probably result in in-season restrictions or closures on a number of drainages to assure escapement goals were achieved.

ADF&G has also expressed considerable conservation concerns for cutthroat and steelhead trout stocks in Area 2C. In 1993, ADF&G proposed the most conservative suite of regulations for these species anywhere in the Pacific Northwest and the Board has adopted these proposals. A sizable increase in fresh water effort would impact these stocks resulting in a need for additional restrictions in the sport fishing regulations to ensure sustained yield.

A GHL in Area 3A would likely result in increased effort toward mixed marine stocks of chinook and coho salmon, as well as lingcod, rockfish, and other groundfish. There could also be impacts to existing freshwater fisheries for salmon and resident species. Most marine salmon fisheries in Southcentral Alaska are fully

allocated. Diversion of effort to marine salmon fisheries will likely increase conservation concerns and intensify existing allocation conflicts. This diversion is likely because many charters in Area 3A offer chinook or coho salmon fishing in addition to halibut. There is now an elevated level of concern for coho salmon conservation following poor returns throughout Southcentral Alaska. Marine chinook fisheries in Cook Inlet have also grown in recent years with freshwater restrictions designed to ensure adequate escapement. In addition, there has been modest growth in off-season troll fisheries for feeder chinook salmon, with concerns over interception of threatened or endangered stocks. This growth has ignited allocation battles in marine fisheries and concerns over accountability of harvest in mixed-stock fisheries.

Restrictions in the halibut fishery would probably also divert a significant amount of effort and harvest toward other groundfish stocks for which there are already conservation concerns. ADF&G and the Board have expressed conservation concerns for rockfish, lingcod, and sharks throughout the region. The Board has enacted progressively restrictive harvest regulations for all of these species during the last ten years, including some of the most restrictive bag limits, seasons, and size limits on the west coast. Increased guided effort on these stocks would exacerbate concerns for the sustained yield of these stocks.

The majority of salmon harvested by sport anglers in Area 3A are taken in freshwater fisheries. Every major salmon stock in Area 3A is already fully allocated. If charter and lodge businesses turned to freshwater fishing opportunities in response to the GHL, the increase in effort and harvest would also elevate existing allocation battles between user groups.

4.5.7 Moratoria: Summary and Conclusions

1. Information from ADF&G Sport Fish Division, charter associations, and earlier estimates from ISER indicate anywhere from 450 to 600 'active' charter vessels. In 1998 there were 1,085 vessels which participated in the logbook program with saltwater bottom fish activity (581 in Area 2C and 504 in Area 3A). No attempt was made to determine how many of those were 'full-time' operators. That number increased to 1,108 in 1999 (588 in Area 2C and 520 in Area 3A), with approximately 350 of those vessels being unique to 1999, indicating considerable entry/exit in this fishery from 1998-1999.

2. Earlier estimates from the 1997 study indicated that 402 'full-time' charter vessels, each operating at 50% load factor (operating 75% of available days at 66% seat capacity) could have taken the 1995 charter fleet harvest. Given the 1998 harvest level (an increase of about 30 % over 1995 levels for total Area 2C and 3A pounds harvested, and 15% increase in total numbers of fish harvested), the estimate of full-time equivalent charter vessels would be between 462 and 522 vessels, without taking into account changes in the average weight of fish harvested.

3. The alternatives under consideration would qualify between 497 and 694 vessels, if 1998 logbook participation is required. These numbers are substantially less than the numbers actually participating in 1998 and 1999, based on the logbook information. Option 4 only requires participation in any year 1995-1998 and would qualify 2,073 vessels. Allowing supplementary information for qualification (other than IPHC license and/or 1998 logbook) could increase the number of qualifying participants.

4. The calculations were based on vessel participation history as opposed to individual (owner) participation history. However it is likely that the vessel numbers shown will closely approximate total permit numbers if the Council chooses to base qualification on owner participation history. Nevertheless, this decision is among the most critical with regard to a moratorium, in terms of granting permits to the appropriate recipients and minimizing disruption to the charter fleet in the initial allocation of permits; i.e., in many cases the current owner of a particular qualifying vessel may not be the individual owner associated with the vessel's qualifying catch history.

5. Although the total harvest capacity of the fleet is difficult to estimate, the currently licensed fleet (based on 1998 logbooks) has a harvest capacity well above the current harvest level, and even the currently active fleet is probably not operating at its maximum capacity. The presence of excess harvest capacity reduces the effectiveness of a moratorium and the ability to predict when it may become constraining on harvest. Only when latent capacity is filled would a moratorium become effective at maintaining harvest within the GHL.

6. Client demand may be the more effective limiting factor on growth in this industry sector than a moratorium, or a moratorium and quota limit, depending on where the limit is set.

7. The more restrictive moratorium options being considered may result in an effective moratorium; i.e., along with other management measures, may be effective at keeping the charter fleet within a GHL. This is particularly true if the GHL is set at a level higher than the current harvest level, and/or if it is set at a fixed poundage. A GHL based on a floating percentage, combined with declines in overall halibut biomass, reduce the likelihood of the moratorium's effectiveness; i.e., at low GHL levels, there likely will be excess capacity relative to that GHL under all options.

8. A moratorium would likely help promote economic stability for existing charter operators, particularly in areas where dramatic increases in participation have occurred recently. However, the issue of who receives the permit will also play an important role in determining future stability. Some of the benefits derived by charter operators from a moratorium would come at the expense of losses to the charter clients in terms of potential price increases for charter trips, which would result in reduced net angler benefits.

9. The interrelationship, and potential conflicts, between an area-wide moratorium and local level (LAMP) moratoria needs to be considered. An area-wide moratorium may negatively impact the development of fisheries in areas without excess charter effort, without necessarily helping in areas that are already overcrowded. LAMP moratoriums may be more effective at resolving these local area issues, but likely would not be effective relative to attainment of GHL goals.

10. There is still uncertainty in the accuracy of the logbook reports. The State has recommended a minimum 3-year time series of logbook data to compare with data collected in the statewide harvest and creel surveys.

4.6 Economic and Socioeconomic Impacts of the Remaining Alternatives

This section provides information on the economic and socioeconomic impacts of the alternatives including identification of the individuals or groups that may be affected by the action, the nature of these impacts, quantification of the economic impacts if possible, and discussion of the tradeoffs between qualitative and quantitative benefits and costs.

In September 1997, the Council approved the guideline harvest levels (GHL) for the halibut charter sector in Areas 2C and 3A. The GHLs were based on 125% of the charter sector's 1995 catch and equated to 12.35% of the combined commercial and charter sport halibut quota in Area 2C, and 15.57% in Area 3A.

In April 1999, the Council identified for analysis: 1) a suite of GHL management measure alternatives; 2) alternatives that would change the GHL as approved in 1997; and 3) area-wide and LAMP moratoria options under all alternatives. The RIR will analyze the economic and social impacts on the commercial fleet of this open-ended reallocation.

4.6.1 Description of Fleet, Fishery, & Industry

A description of the charter and commercial halibut fleet, fishery, and industry is provided in Section 3. Baseline information on the number of fishery participants and harvest levels for 1994-98 is provided. Projected growth in the halibut stock and charter fishery is also discussed.

Additional information on the commercial fleet can be found in two data series and is incorporated here by reference. A total of 48 community and six summary reports by Shirley et al. (1998) summarize fishery-specific data on holdings of State of Alaska or Commercial Fisheries Entry Commission (CFEC) limited entry permits, sablefish and halibut quota shares from 1995 through 1998, and fishery gross earnings for Gulf of Alaska coastal communities. Community profiles for Southeast Alaska, Southcentral Alaska, Prince William Sound, and Kodiak entitled *Faces of the Fisheries*, also provide a snapshot of coastal communities as of 1992 (NPFMC 1994).

Coastal Community Considerations

Both charter and commercial fisheries are important to the economies and social structures of coastal communities in Areas 2C and 3A. Few data are available to describe the social impacts of charter fishing on coastal communities, however, a recent description of economic and social contributions from commercial fishing to coastal communities are provided in a series of reports contracted by NMFS (1998).

The potential effects of displacing charter and commercial fishing effort in Glacier Bay and the social contributions of fishing to communities are described in NPS (1998). Fishing affects community character by flavoring appearance, by influencing the community's degree of prosperity, by attracting certain kinds and numbers of people, and by structuring activities, and to some extent, belief systems of those people. Changes in fishing activities can also affect a community's sense of cohesion. The effects of commercial fishing activity on the cities and villages of the region have long been apparent even to the casual visitor. The fishing lifestyle imparts a cultural identity to communities that is recognizable throughout the world. This identity is apparent along the waterfront areas in towns with large fishing presence. The docks and marinas of fishing communities differ substantially from those port communities that support primarily recreational boating. Recreational businesses, restaurants, and bars also reflect the nature of the fishing lifestyle. Communities for which commercial fishing is the key economic sector exhibit a high degree of cohesion; that is, most of the community members participate in the same or supporting occupations and thus share a common language and lifestyle (NPS 1998).

Potential impacts of Glacier Bay fishery closure

Between 31-46 commercial fishing vessels were displaced as a result of a closure to commercial fishing in Glacier Bay (NPS 1998). These vessels have an associated 188,000-328,000 lb of harvest. Quota share harvests associated with those vessels would be allowed to be taken in other parts of Area 2C. The analysis reports that crossover from displaced commercial vessels into charter fisheries may be limited by lack of economic means by fishermen in some communities to purchase charter vessels or adapt their commercial vessels to charter operations and by some communities to develop tourist-related businesses for accommodations, meals, etc.

The proposed action to implement GHLs in Areas 2C and 3A will allocate halibut between charter and commercial sectors, which often occur in the same coastal communities. Losses to one sector may or may not be offset by gains in the other sector. This will not likely to occur within a particular community, but is more likely to occur within the affected regulatory area.

4.6.2 Expected Effects of each Alternative on each Sector

The following RIR is presented to describe the effects of the Council's GHL alternatives on the charter, commercial, and to a lesser extent, the non-charter angler. As can be seen in the April 1999 list of alternatives, the alternatives, options, and suboptions result in quite complex interactions among themselves and compared with the original GHL decision in 1997. A staff discussion paper (NPFMC 1999) reviewed the merits of restructuring the alternatives to facilitate the analytical process, Council review, and decision-making. The following restructured alternatives provide the basis for the following RIR.

4.6.2.1 Alternative 1: No action. Do not develop regulations to implement a halibut Guideline Harvest Level.

In December 1997, the NMFS Alaska Regional Administrator informed the Council that the GHL would not be published as a regulation. Further, since the Council had not recommended specific management measures to be implemented by NMFS if a GHL was reached, no formal decision by the Secretary was required for the GHL and the analysis was not forwarded. Taking no action to implement GHL management measures effectively nullifies the 1997 GHL decision by the Council since the RA has notified the Council that it will not forward the 1997 Council analysis for Secretarial review without the implementing measures.

No action would result in continued unconstrained charter halibut harvests and a *de facto* reallocation of halibut from the commercial sector to the charter sector. This analysis assumes that sport halibut removals will increase by approximately 9 % in Area 2C and 4% in Area 3A for the charter sector and 1 percent in the unguided sector over the next 5 years. If that rate of growth does occur in future years, the ex-vessel gross revenues to the commercial fishery in areas 2C and 3A would decline given an elastic demand curve at the ex-vessel level. Net benefits to consumers of commercially caught halibut would also decline. There is not enough information to discern whether these losses would be offset by the increases in net benefits to charter operators and guided anglers. Nor is there enough information to compare the loss of regional economic activity associated with the commercial sector against the respective gain for the charterboat sector. These estimates of growth contain an unquantifiable, but large degree of uncertainty.

4.6.2.2 Alternative 2: Approve management measures to implement the halibut charter Guideline Harvest Level.

Alternative 2 proposes to establish a guideline harvest level program in Areas 2C and 3A that when reached, would not close the fishery, but would trigger management measures in future years to constrain anglers fishing on charterboats to within the GHL. By itself, this GHL has no management effect on either charter or commercial harvests. The operational definition of the GHL and the associated management measures are critical components of the program.

Section 3 reviewed the baseline biological and economic information on the status of the halibut stock, charter and commercial fisheries and provided five-year projections for biomass and charter harvests.

Five specific management decisions have been identified which conform with the Council's April 1999 suite of alternatives, options and suboptions to define the GHL and identify management measures that will result in charter harvests that meet that definition. The expected effects of the options and suboptions under Alternative 2 on the charter and commercial sectors will be reviewed by issue.

The following general picture was drawn:

2. halibut biomasses are at peak abundances, but likely to decline in the short-term;
3. 2000 quotas declined, but are likely to remain steady in the short-term;

4. charter harvests are continuing to increase, but at declining rates;
5. commercial quotas decline as charter harvests (and all other removals) increase.

Section 1 reviewed the need for action and presented the proposed alternatives for analysis and a staff-restructuring of the alternatives to facilitate this analysis. Five specific management decisions have been identified which conform with the Council's April 1999 suite of alternatives, options and suboptions. The expected effects of the options and suboptions under Alternative 2 on the charter and commercial sectors are reviewed by issue.

ISSUE 1: Apply GHLs to Areas 2C and/or 3A to trigger management measures as a fixed percentage annually expressed in pounds or a fixed range in numbers of fish, based on 125% of 1995 or 1998 charter harvests.

ISSUE 2: Implement management measures, with an option to close the fishery in-season once the GHL is reached.

- line limits
- boat limit
- annual angler limit
- vessel trip limit
- bag limits
- super-exclusive registration
- sport catcher vessel only area
- sportfish reserve
- rod permit
- possession limits
- prohibit crew-caught fish

ISSUE 3: Adjust
the GHL fixed range of fish under varying halibut abundance.

ISSUE 4: Determine whether a GHL or allocation.

ISSUE 5: Establish a moratorium, either area-wide or local

4.6.2.2.1 ISSUE 1: Apply GHLs to Areas 2C and/or 3A to trigger management measures as:

Option 1: Fixed percentage annually expressed in pounds.
Based on 1995: GHL equal to 12.35% in 2C and GHL equal to 15.57% in 3A.
Based on 1998: GHL equal to 16.39% in 2C and GHL equal to 12.87% in 3A.
Option 2: Fixed range in numbers of fish.
Based on 1995: GHL range equals 50 - 62 thousand fish in 2C and 138 - 172 thousand fish in 3A.
Based on 1998: GHL range equals 54 - 68 thousand fish in 2C and 143 - 179 thousand fish in 3A.
Option 3: Manage GHL as a 3-year rolling average.
Option 4: Apply the GHL as a percentage to the CEY by area after non-guided sport and personal use deductions are made, but prior to deductions for commercial bycatch and wastage.

Under any option, management measures would be triggered 1- 2 years after attainment of the GHL, but prior to the start of the charter fishery season for industry stability.

The Council faced two decisions under Issue 1. Option 1 would set the GHL as a fixed percentage (expressed annually as pounds). Option 2 would set the GHL as a range (in numbers of fish that is fixed across all years). Option 2 also contains provisions to reduce that range during years of "significant stock decline." Defining "significant stock decline" is further discussed under Section 4.6.2.2.3. (Note that the Council has

the option to set the percentage or range in either pounds or numbers.) The Council considered whether to set that fixed percentage or fixed range for each area based on 1995 or 1998, or at some level in between those two years.

Option 1

Option 1 would set the GHL as a fixed percentage of the 'combined charter and commercial quota' such that the poundage level would float annually according to the results of the halibut stock assessment. To do this, the Council will need to specify a procedure to implement the GHL as a pre-season allocation. That is, there is currently no pre-season charter 'quota' and, therefore, no combined quota upon which to calculate the GHL percentage. The Council could interpret the GHL as a 'quota' and the IPHC could deduct all 'non-quota' removals to determine a combined charter and commercial CEY for each area.

A description of the IPHC procedures for halibut quota setting under a GHL follows to explain how the GHL will be determined and to elicit Council intent on its application. The staff of the IPHC calculates a constant exploitation yield (CEY – equivalent to the Council's acceptable biological catch) from the IPHC catch-at-age-and-length model. From the CEY, the staff subtracts other removals (sport catch, bycatch, waste, and personal use). Because of the one year lag in recreational fishery harvest estimates, ADF&G staff provide an estimate of each year's harvest in October. This estimate is based on a ratio of creel survey and SWHS estimates in Area 2C. This estimate is a projection of past SWHS estimates in Area 3A. For both areas, the projections of numbers of fish are then multiplied by current year's estimates of average weight.

Thus far, the IPHC has used the current year's estimate as an estimate of the upcoming year's sport harvest when subtracting the sport removals from the CEY. The remainder is the Setline CEY, the amount available to the commercial fishery according to the model. The staff then evaluates the model results in terms of biological and fishery information and the status of the resource to recommend quotas for consideration by the Commission and the industry. In many cases, the quota recommendations deviate from the CEY estimated from model results. The staff operates on a philosophy of "slow up and fast down," which calls for slow increases in quota as biomass increases.

The Commission considers staff and industry recommendations to set quotas for the year, which often deviate from CEY calculations. In none of the years from 1995 through 1998 did the Commission set quotas equal to the CEYs calculated from the model. Rather, the staff-recommended quotas deviated from the model results, and the Commission often modified the staff recommendations. The Commission almost always accepted or lowered the staff recommendations.

Under the GHL program, the IPHC staff will recommend and the Commission will set a quota for the combined commercial and charter harvests. It is at this point that the Commissioners may adjust those recommendations for conservation purposes. Therefore, both the charter and commercial quotas potentially may be reduced since the allocation formula set by the Council to determine the actual GHL is based on the Commission's final combined quota. Alternatively, the Council formula could be applied to the combined quota, and then the charter and commercial quotas could be separately adjusted by the Commission.

Option 2

Option 2 would convert the GHL from a fixed percentage, for which the poundage would be adjusted annually according to changes in the stock assessment and resulting CEY, to a fixed range that does not adjust annually. The lower end of the range would be set equal to the base year's harvest; the upper end would be set at 125% of the base year's harvest. The GHL fixed range is intended to compensate the charter industry for unharvested fish in years of high abundance by offsetting those losses in periods of very low

halibut abundance. It is linked to the industry's need for stability, that is, to provide a 'floor' of a minimum number of halibut to sustain the charter fleet near its current level and a 'ceiling' to allow for limited growth. If the charter halibut harvest exceeds the upper limit of the range in a year, charter clients would be restricted by some measure(s) to reduce their harvest back to within the range in subsequent years. If under restrictive measures, the charter halibut harvest is reduced below the lower limit of the range, those restrictions would then be liberalized to increase the harvest back within the range. If charter harvest falls below the lower limit of the range even though the fishery is operating under the 11-month charter season (8-month actual season) and 2-fish bag limit regulations, season and bag limit regulations will not be liberalized to increase harvest back within the range; however, additional harvest restrictions (e.g., 1-fish bag limit or line limits) that the Council could adopt under the GHL would be liberalized if charter harvests fell below the range.

Basing the GHL on numbers of halibut landed by the charter fleet is a second feature of Option 2. In contrast to many commercial fisheries, nearly all recreational fisheries are managed based on numbers, rather than weight, of fish landed. Size limits may be employed in combination with bag and possession limits to limit the harvest of large or small fish (depending on the management need), however they are rarely used singularly. Limits on pounds of fish landed are rarely used as a regulatory mechanism in recreational fisheries, because of the higher number of vessels and dispersed nature of the fishery. Because sport-caught fish are not bought or sold, it is impractical and expensive to have enforceable weigh stations at all sites of sport landings. In the case of halibut, many fish are cleaned at seas and carcasses are disposed of before returning to port. Therefore, adoption of the GHL in numbers rather than pounds would have the advantage of linking the limit to the most common management strategy for recreational fisheries, that is bag and possession limits.

In summary, an area GHL range would be a set number of fish that would apply across years. Even if the GHL were specified in numbers of fish, some estimate of mean weight and harvest biomass would be needed to subtract the charter removals because the commercial quota is based on weight. Alternatively, the CEY could be converted to numbers of fish, the charter range could be calculated, and then the remainder could be converted back to pounds to set the commercial quota. Under either scenario, the procedure is not straightforward and involves estimates or assumptions about mean weight.

Table 4.6.1 depicts the GHL ranges by area for 1995-98 and provides a summary of baseline information for operationally defining the GHL (percentage versus range and base year). The columns in the table list information on the commercial quota in pounds, commercial catch in pounds, charter harvest in pounds, the average pounds/fish, charter harvests in fish, 125% of charter harvest to determine the GHL in pounds, the GHL percentage calculated as if that year was the base year, and the GHL in pounds converted to fish using the average lb/fish.

Table 4.6.1. GHL formulation updated to reflect corrected ADF&G SWHS data for 1996 through 1999.

IPHC Area 2C

Year	Commercial Catch Limit (x 1,000 lb)	Commercial Catch (x 1,000 lb)	Charter Harvest (x 1,000 lb)	lbs/fish	Charter (Numbers of fish)	Charter GHL @ 125% of Sport Charter (x 1,000 lb)	GHL as % of Catch Limit + Sport Charter	GHL in Numbers of fish
1995(a)	9,000	7,760	986	19.88	49,615	1,233	12.35%	62,000
1996	9,000	8,800	1,187	22.15	53,590	1,483	14.56%	67,000
1997	10,000	9,890	1,034	20.19	51,181	1,292	11.71%	64,000
1998	10,500	10,230	1,584	29.14	54,364	1,980	16.39%	67,900
1999	10,490	10,202	939	17.80	52,735	1,173	10.26%	65,900
Average (95-99)	9,798	9,376	1,146	21.83	52,297	1,432	**13.05%**	65,360
Average (98-99)	10,495	10,216	1,261	23.47	53,550	1,577	13.32%	66,900
Average (97-99)	10,330	10,107	1,185	22.38	52,760	1,482	12.79%	65,933

IPHC Area 3A

Year	Commercial Catch Limit (x 1,000 lb)	Commercial Catch (x 1,000 lb)	Charter Harvest (x 1,000 lb)	lbs/fish	Charter (Numbers of fish)	Charter GHL @ 125% of Sport Charter (x 1,000 lb)	GHL as % of Catch Limit + Sport Charter	GHL in Numbers of fish
1995(a)	20,000	18,340	2,845	20.64	137,843	3,557	15.57%	172,300
1996	20,000	19,690	2,822	19.74	142,957	3,527	15.45%	178,700
1997	25,000	24,680	3,413	22.33	152,856	4,266	15.01%	191,100
1998	26,000	25,870	2,985	20.82	143,368	3,731	12.87%	179,200
1999	24,670	25,287	2,533	19.23	131,726	3,167	11.64%	164,700
Average (95-99)	23,134	22,773	2,920	20.55	141,750	3,650	**14.11%**	177,200
Average (98-99)	25,335	25,579	2,759	20.03	137,547	3,449	12.26%	171,950
Average (97-99)	25,223	25,279	2,977	20.79	142,650	3,721	13.18%	178,333

(a) These tables apply corrected SWHS estimates for 1996, 1997, 1998 to the GHL formula. SWHS Estimates for 1995 are not revised using methods implemented for revising 1996-1998 as the source data can not be retrieved from backup tapes.

Base year

After having made its decision to adopt a fixed percentage or a range, the Council must still determine the base year upon which to set that percentage or range for each area. The Council's original GHL decision was based on 1995 harvest, the most recent data available at the time of final action in September 1997. The Council may now choose to revise the base year to 1998, the most recent harvest information available for Council final action in February 2000 or to set the GHL at some point between 1995 and 1998 levels. The Council may choose a percentage or number of fish from within the range associated with 1995 through 1998:

Area 2C		Area 3A	
12.35-16.39 %	50-68 thousand fish	12.87-15.57%	138-179 thousand fish

The choice of GHL base year has differential impacts on the charter and commercial sectors depending on the area and whether a percentage (pounds) or a range (fish) is used to set the GHL. For Area 2C, the lower percentage (12.35%) that could be set would be based on 125% of 1995 harvests, the highest (16.39%) would be based on 125% of 1998 harvests (Table 4.6.1). The lower range (49,600-62,020 fish) and higher range (54,360-62,020 fish) that could be set would be based also on 1995 and 1998, respectively. Note that the percentages and ranges for 1996 (14.56% and 53,590 - 66,990 fish) and 1997 (11.71% and 51,180 - 63,980 fish) for Area 2C are within the range of the alternatives considered by the Council.

The effect of revising the GHL to use 1998 as the base year is mixed for Area 3A. The lower percentage (12.87%) that could be set would be based on 1998, while the higher would be based on 1995 (15.57%). However, the lower range (137,840-172,300 fish) that could be set would be based on 1995 and the higher range (143,370 - 179,210 fish) would be based on 1998. The lower percentage in 1998 is associated with a higher range of fish as a result of only a 4% increase in charter harvest compared with a 30% increase in the commercial quota (6 million lb) between 1995 and 1998 in Area 3A. The percentages and ranges for 1996 and are included within the range of alternatives analyzed for Area 3A, but those for 1997 are not.

Calculation of the GHL for the reference years of 1995 and 1998 or the intermediate years of 1996 and 1997 is straight-forward. A combined commercial-charter CEY can be calculated by applying the CEY process described above and subtracting all removals except for commercial and charter harvests. Therefore, a practical method of approximating the GHL that would have occurred if it had been implemented can be derived from the sum of commercial quotas set by the Commission and the actual charter harvest for a year (more properly, we would use a pre-season, projected harvest).

In Table 4.6.1, the 1995 and 1998 base years were selected to back-calculate the 1995-98 GHLs to approximate what the GHLs might have been had they been implemented during 1995-98. Please note that these estimates are not necessarily what the GHL would have been in those years had they been effective. Applying the GHL percentage for a given base year (1995-98) results in an approximation of the GHL for those same years in pounds of fish. That is, any one of the four years could be chosen as the base year. Once a base year is selected, a back-calculation of what the GHL would have been in each of those four years may be demonstrated.

In summary, the Council could have set the percentage or range at any point within the ranges listed in Table 4.6.1. The obvious allocational impacts are that the higher the GHL is (in pounds or fish), the greater the allocation would be to the charter sector and the lower the quota assigned to the commercial sector. Biological concerns associated with Option 2 for setting a "permanent" GHL in numbers of fish based on years of peak abundance that would also apply during years of future low abundance are discussed under Section 4.6.2.2.3.

Note that:

6. the choice of base year only determines the resulting percentage, which is then fixed in time and applied to the combined quota from the annual IPHC stock assessment;
7. the GHL itself has no impact when the fishery is not shut down when it is reached, rather it is the associated management measures that could produce impacts.

These issues are discussed further under Issue 2.

Projections

For illustrative purposes only, projections of when the GHLs might be reached based on the 1998 IPHC stock assessment are presented for Areas 2C and 3A. The projected rates of growth from the 1997 Council analysis (previously described in Section 3) applied to the 1998 actual charter harvest results in a depiction of where the charter fishery is now relative to the GHL options and a projection of when the GHLs may be reached. Figure 4.6.1 shows that 1998 Area 2C charter harvests already exceeded a 1995-based GHL (as approved by the Council in 1997). Figure 4.6.1 also assumes a constant 1998 quota through 2005 for illustrative purposes.

A post-season evaluation would determine whether an area GHL was exceeded. It was not possible to back-calculate GHLs exactly, however, ADF&G data indicate that 1998 Area 2C charter harvests appear to have

exceeded 125% of the Area 2C 1995 GHL base level (1.23 M lb). It also appears to have exceeded the back-calculated GHL of 1.26 M lb, IPHC staff's best approximation of what the GHL would have been had the 1995-based GHL been in effect (Table 4.6.2). Therefore, had the 1997 GHL decision been approved by the Secretary, GHL management measures would be triggered for the next fishing season in Area 2C.

Table 4.6.2. Projected Area 2C charter harvests using higher and lower charter growth projections.

	higher			lower		
Year	Charter	Higher % chang	Cum%	Charter	Lower % Chg	Cum %
1998	1,767,001			1,767,001		
1999	1,930,909	9.28	9.28	1,844,249	4.37	4.37
2000	2,105,814	9.06	17.96	1,924,176	4.33	8.63
2001	2,292,427	8.86	26.48	2,006,871	4.3	12.86
2002	2,491,502	8.68	34.86	2,092,422	4.26	17.06
2003	2,703,841	8.52	43.1	2,180,924	4.23	21.23
2004	2,930,299	8.38	51.82	2,272,474	4.2	25.49
2005	3,171,784	8.24	51.82	2,367,171	4.17	25.49
average		8.72			4.27	

Figure 4.6.1 also "projects" that under higher growth rates, the charter harvest in Area 2C could reach the 1998-based GHL sometime during 2000 - 2001 and under lower growth rates, sometime during 2003 - 2004. Please note that these projections are not "predictive." The authors are not suggesting that the GHL would really be reached in those years, because there is too much uncertainty to predict client demand. The timeline does offer some perspective, however, on where the fleet is now versus how much further harvests must rise before the GHL is triggered.

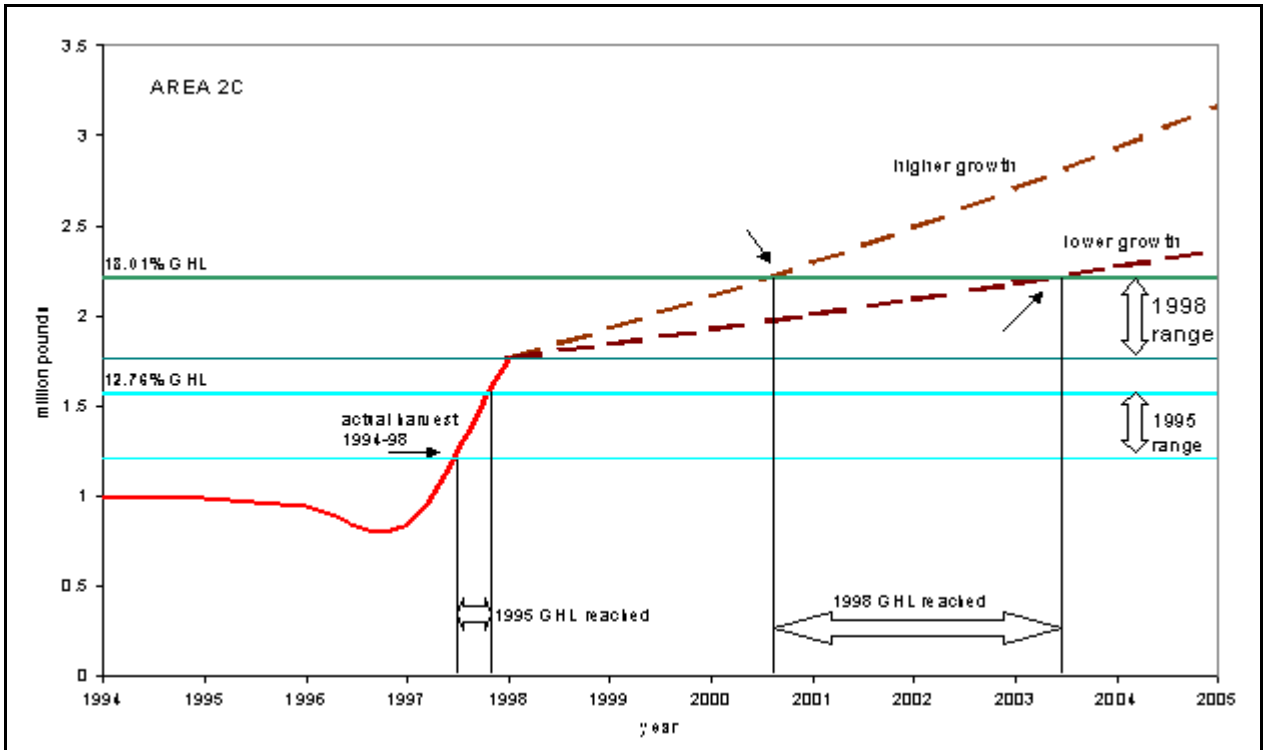


Figure 4.6.1. Hypothetical timeline for when the Area 2C GHL may be reached (based on actual 1994-98 charter harvest, lower and higher harvest projections).

Area 3A projections shown in Table 4.6.3 and Figures 4.6.2 indicate that the 1995-based GHL might be reached sometime during 1999 - 2000 under the higher projection and 2000 - 2001 under the lower projection. The 1998-based GHL might be reached during 2000 - 2001 under the higher projection and during 2003 - 2004 under the lower projection.

Table 4.6.3. Projected Area 3A charter harvests using higher and lower charter growth projections.

	higher			lower		
Year	Charter	Higher % chang	Cum%	Charter	Lower % Chg	Cum %
1998	3,238,392	9.63		3238392		
1999	3,550,306	9.38	9.63	3384658	4.52	4.52
2000	3,383,229	9.15	18.58	3536032	4.47	8.91
2001	4,238,516	8.94	27.33	3692680	4.43	13.26
2002	4,617,609	8.76	35.92	3854776	4.39	71.57
2003	5,022,042	8.59	44.36	4022098	4.35	21.85
2004	5,453,448	8.44	53.35	4796030	4.31	26.24
2005	5,913,564	8.98	53.35	4375564	4.28	26.24
average					4.39	

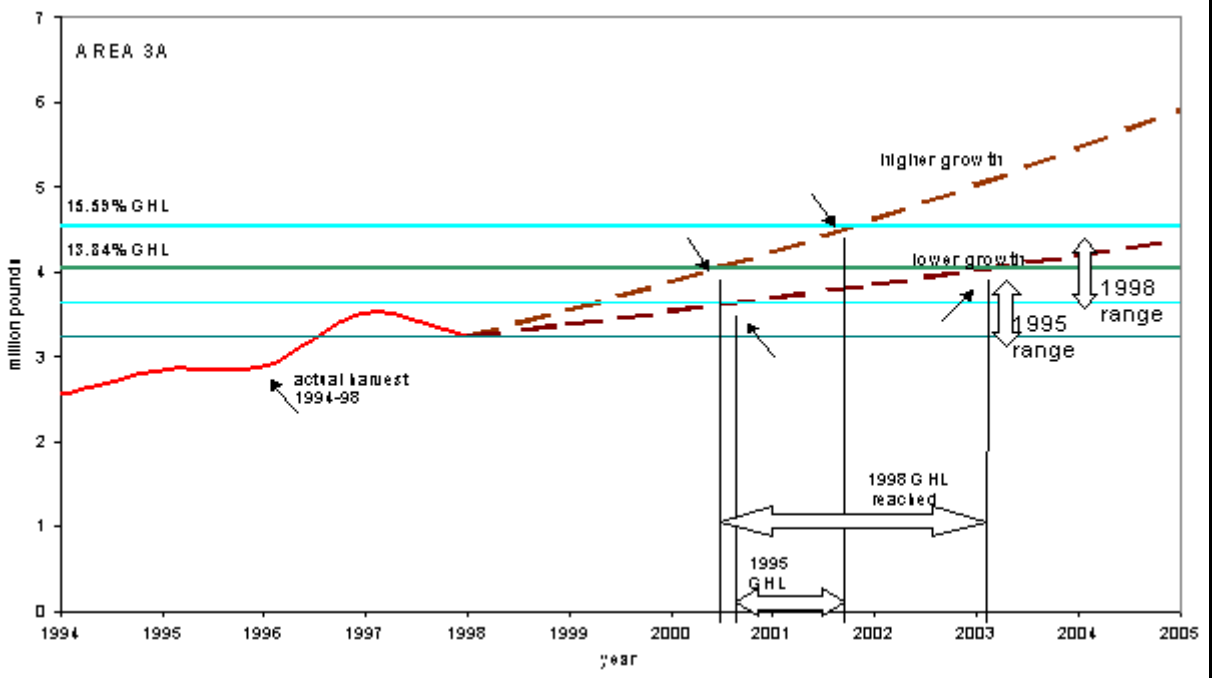


Figure 4. 6.2. Hypothetical timeline for when the Area 3A GHL may be reached (based on actual 1994-98 charter harvest, lower and higher harvest projections).

Option 3

If the Council adopted a GHL as a fixed range in numbers of halibut for 2C and 3A the charter harvest would be gauged against this range at the end of the fishing season. The intent would be to minimize unnecessary disruption to the charter industry while maintaining the three-year running average charter

harvest within this range. The three year running average would commence in the year the Council implements the regulation. Harvest overages (any number of harvested fish that exceeds the upper limit of the range) and underages (any number of unharvested fish that is below the lower limit of the range) may occur in any given year (Figure 4.6.1).

If there is an overage after the first year of the three-year period the fishery manager would have the option to take, or not take, regulatory action in the following year, depending on the magnitude of the overage. If there is an overage again during the second year it would be added to the overage from the first year (i.e. it would be a cumulative overage). However, if the harvest in the second year resulted in an underage the number of unharvested fish would be deducted from the first year's overage.

Annual underages or overages would not justify a modification in charter fishery behavior or regulations to attain the GHL range in a given year of the three-year period. Nor would underages or overages be used to increase or decrease the GHL range. The goal is to maintain the three-year average within the GHL range.

Another approach would take three years to generate the average to determine whether the upper limit of the GHL range has been exceeded. When it has been determined that the upper GHL limit has been exceeded, the management measure(s) in regulation would be triggered for the subsequent year. This alleviates the discretion allowed the NMFS Regional Administrator for interpreting whether an "overage" significantly exceeded the upper limit of the GHL to warrant an immediate triggering of approved management measure(s). It may also alleviate the need to prepare an additional regulatory amendment for Council/Secretarial action to determine whether the "overage" was significant for the trigger.

If the Council adopted a GHL as a fixed percentage or point estimate that would vary annually based upon the combined allocation to the commercial IFQ and charter sectors, the management intent would be to maintain the charter harvest at this point estimate over a period of three years. The intent would not be to manage based on a single year harvest; it would be managed on a three year running sum of overages and underages of charter harvests. The envisioned management scenario over time would be similar to the example described above using a GHL range, with one important difference (Figure 4.6.2).

Since the charter GHL harvest goal is to attain a specific point estimate rather than attaining a harvest within a fixed range as in the example above, and since the actual GHL targeted in a year might vary, it is almost certain that there will be an overage or underage each year. This would mean that it is more likely that NMFS would be required to take regulatory action at some point within the first three years and may be required to take additional actions in each subsequent year. As a result, management would need to be more conservative to ensure that the management intent is achieved.

The GHL range described above would accommodate annual variation in harvest levels and lessen the need for annual management actions to adjust the charter harvest while at the same time meeting the overall management intent. This benefit could be lost if the fixed percentage alternative is selected.

As described above, a second, simpler approach would take three years to generate the average to determine whether the upper limit of the GHL range has been exceeded. When it has been determined that the upper GHL limit has been exceeded, the management measure(s) in regulation would be triggered for the subsequent year. It would alleviate an additional regulatory amendment process compared with the first approach.

Figure 4.6.2 presents a hypothetical example of how a three year running average would be applied to a GHL expressed as a fixed range that does not change annually based on abundance. The charter harvest was 65,000, 70,000, and 80,000 fish in year one, two, and three, respectively. The three year average charter

harvest was 71,667 fish, which falls within the bounds of the GHL range. No regulatory restrictions would be required in the fourth year.

Figure 4.6.3 presents a hypothetical example of how a three year running average would be applied to a GHL expressed as a fixed percentage that changes annually based on abundance. The charter harvest in the first year was 50,000 pounds less than the fixed percentage GHL, but exceeded the GHL percentage by 125,000 and 200,000 pounds in the second and third years, respectively. The three year average of overages and underages results in an overall overage of 91,667 pounds. Regulatory restrictions would be required in the fourth year.

Actions which set the GHL as a range of halibut (a floor in either numbers of fish or pounds), as opposed to a percentage of the available quota, are less likely to negatively impact the charter fleet in general; conversely, these alternatives result in potential negative impacts to the commercial fishery (relative to a floating percentage for the charter fleet) particularly if halibut biomass declines to low levels in the future (an outcome which fails to achieve the objective of the proposed action).

Figure 6.3. Three-year Running Average with a Fixed Range (in numbers of fish)

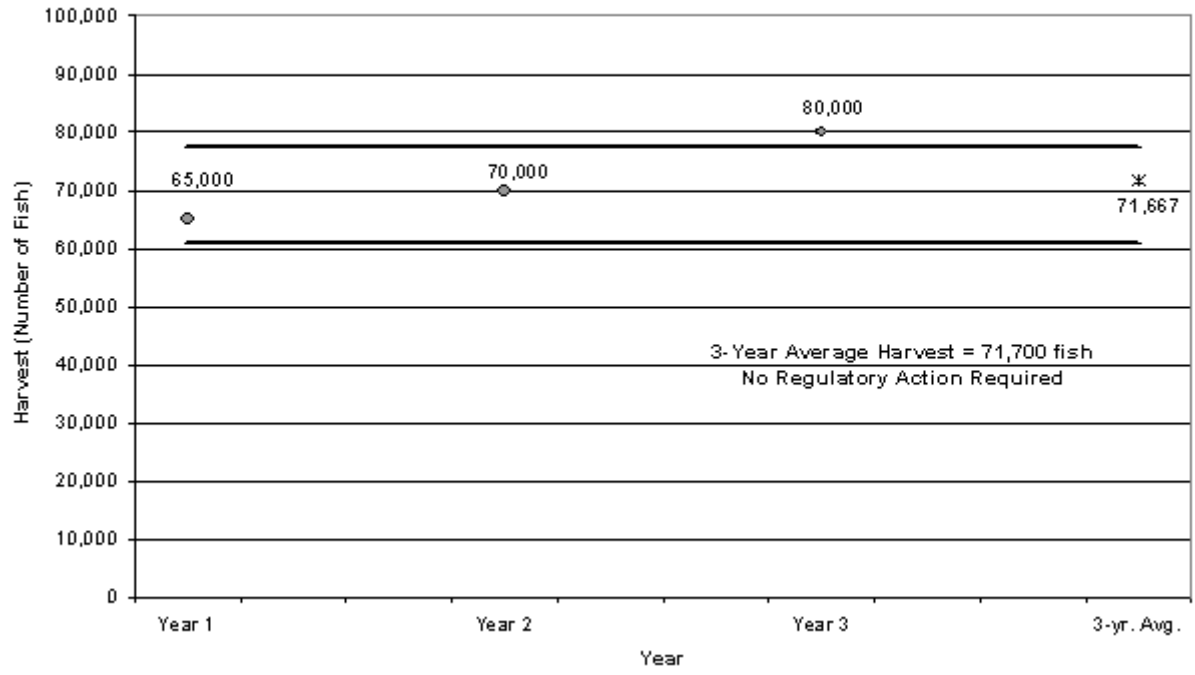


Figure 4.6.3 Three-year running average with a fixed range (in numbers of fish).

Option 4

The current IPHC procedure for calculating the commercial quota (catch limit) deducts all non-commercial removals from the CEY; the remainder is the commercial quota. This procedure will continue until the GHL is actually reached or exceeded for an area. Only when the GHL is reached and the commercial quota is constrained by the full GHL, would this IPHC procedure need to be modified.

In December 1999, staff presented two scenarios for revising the IPHC procedure. All of the options implicitly accept that both the charter and commercial quotas should be adjusted by the IPHC to address

conservation concerns. The charter industry supports splitting the charter and commercial quotas to avoid adjustments to the charter GHL that are not based on conservation (e.g., market saturation).

Option A is the closest to the current IPHC procedure. It proposes that all non-charter and non-commercial removals be deducted from the CEY; the remainder would be the combined charter/commercial quota. The Council GHL formula would automatically be applied to that combined quota to calculate the separate charter and commercial splits. Option B differs from Option A in that it proposes to apply the Council formula before the IPHC determines the quota. Options A and B are not included in the alternatives but are provided as additional information to reflect Council discussion of this issue in December 1999.

At the December meeting, the Council added Option C to Alternative 2, Issue 1. It addresses a perceived fairness issue by the charter industry that is not included in Options A or B. It proposes to deduct only non-charter and personal use (i.e., subsistence) removals from the CEY before applying the Council formula to set the charter GHL. Bycatch and wastage removals would then be deducted from the remainder, from which the IPHC would determine the commercial quota. The Council raised two issues related to this proposed procedure: 1) a fairness issue of counting trawl bycatch and longline wastage only against that portion of the CEY that would be used to determine the commercial quota rather than against all users; 2) the significantly different GHL percentage that would result for the charter sector compared with those already proposed in the analysis. A third issue raised by IPHC staff is the lack of specific steps in the current IPHC procedure whereby the IPHC makes conservation and non-conservation adjustments to the quotas.

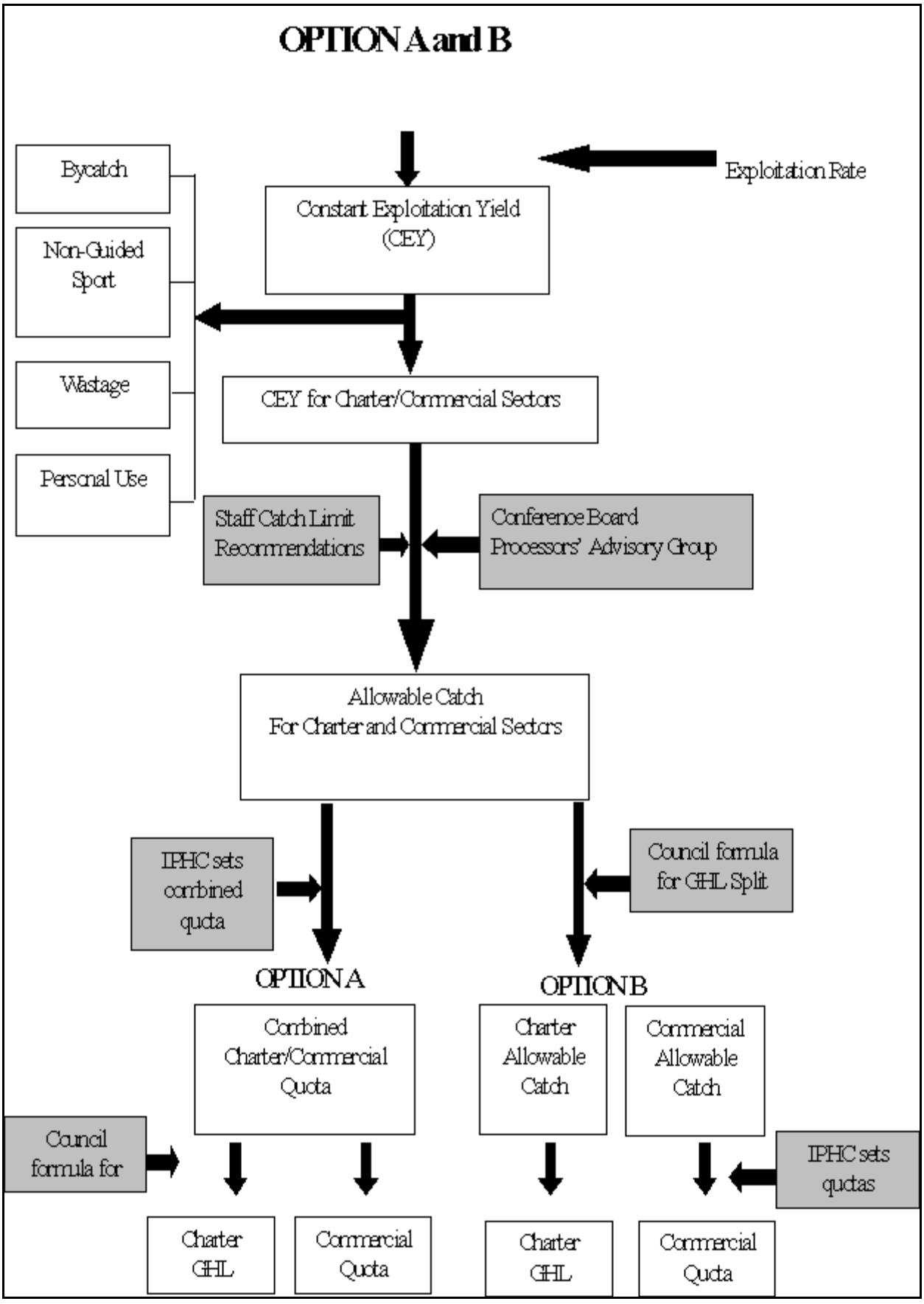
Options B and C do not fully capture the IPHC quota-setting process. IPHC staff recommended a catch sharing plan for all user groups, similar to a plan in place for Area 2A. The Council continued to limit the actions in this analysis to the charter and commercial sectors. The Council is scheduled to take final action on a separate analysis to define halibut subsistence use in October 2000. The Council has not initiated any new action to manage the non-charter halibut sector.

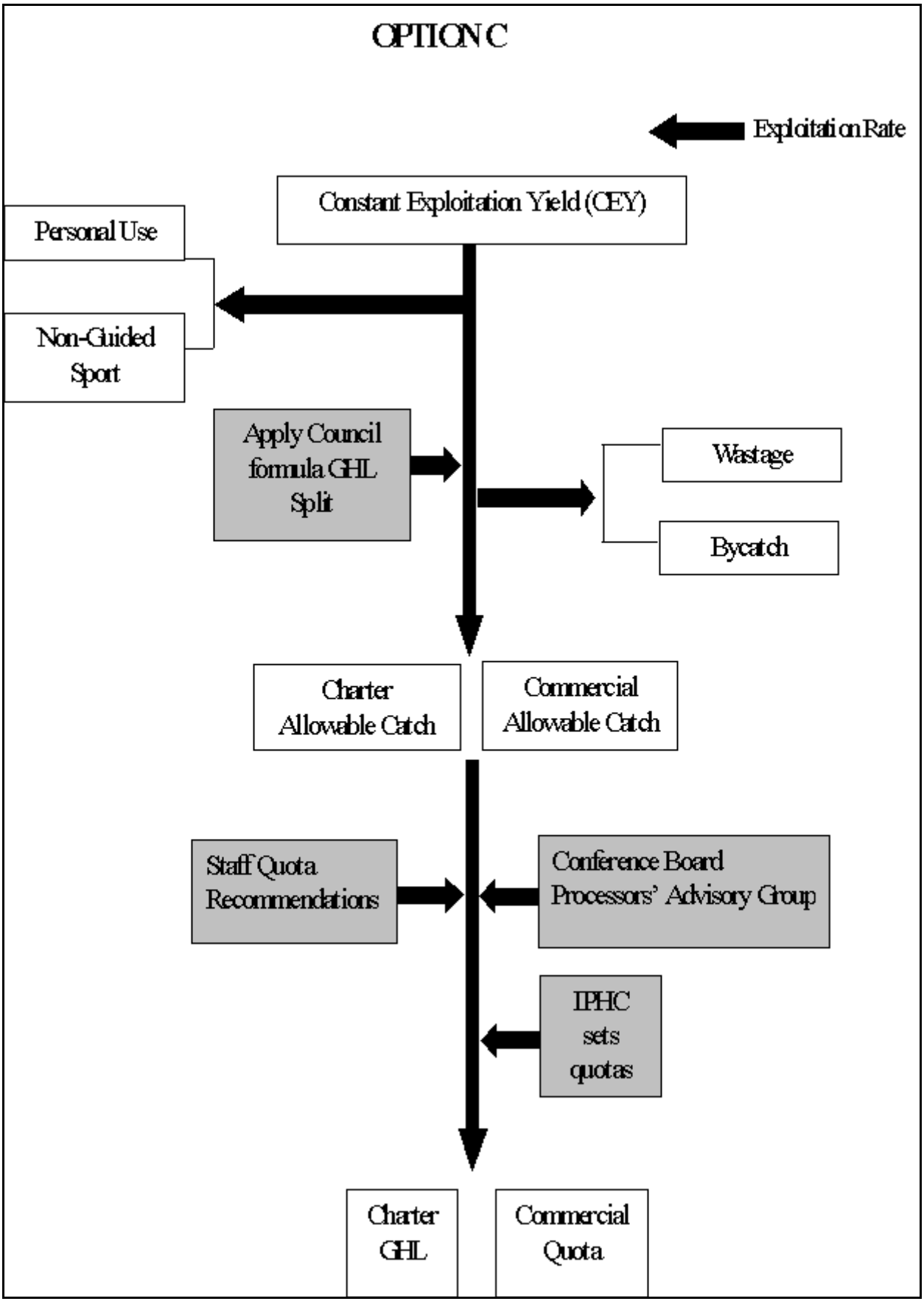
4.6.2.2.2 ISSUE 2: Implement GHL management measures.

None, any, or all of the following management measures could be implemented up to two years after attainment of the GHL (one year if data is available), but prior to January 1 of the year in which they would apply. Restrictions would be tightened or liberalized as appropriate to achieve a charter harvest below the GHL, if a point estimate, or within the GHL range, if a range.

- line limits
- boat limit
- annual angler limit
- vessel trip limit
- bag limits
- super-exclusive registration
- sport catcher vessel only area
- sportfish reserve
- rod permit
- possession limits
- prohibit crew-caught fish

The Council has identified 11 management measures that could adjust harvest in an effort to maintain the charter fishery within the allocation provided under a GHL. Each of these tools has a different effect on harvest potential. This effect will likely vary between areas, and perhaps ports, and will be influenced over time by changes in stock abundance. Each tool must be continually evaluated in context of the level of action required, the stock abundance, and the regulatory area. Market factors such as participation levels and willingness to pay for the opportunity to sport fish for halibut will also influence future harvest potential and was considered by the Council in its recommendation of a preferred regulatory strategy.


OPTION A and B
Bycatch
Non-Guided Sport
Wastage
Personal Use
Exploitation Rate
Constant Exploitation Yield (CEY)
CEY for Charter/Commercial Sectors
Staff Catch Limit Recommendations
Conference Board Processors' Advisory Group
Allowable Catch For Charter and Commercial Sectors
IPHC sets combined quota
Council formula for GHL Split
OPTION A
OPTION B
Combined Charter/Commercial Quota
Charter Allowable Catch
Commercial Allowable Catch
Council formula for
IPHC sets quotas
Charter GHL
Commercial Quota
Charter GHL
Commercial Quota


OPTION C
Exploitation Rate
Constant Exploitation Yield (CEY)
Personal Use
Non-Guided Sport
Apply Council formula GHL Split
Wastage
Bycatch
Charter Allowable Catch
Commercial Allowable Catch
Staff Quota Recommendations
Conference Board Processors' Advisory Group
IPHC sets quotas
Charter GHL
Commercial Quota

Determination of the best management measure or combination of measures to use was based on the best, most current information available. For this reason, it is preferable to make a list of tools available from which a manager may select one or more of the tools listed. Implementation and timing of a procedure for implementing GHL management measures is discussed in Section 4.6.2.2.5.

4.6.2.2.2 ISSUE 2: Implement GHL management measures.

None, any, or all of the following management measures could be implemented up to two years after attainment of the GHL (one year if data is available), but prior to January 1 of the year in which they would apply. Restrictions would be tightened or liberalized as appropriate to achieve a charter harvest below the GHL, if a point estimate, or within the GHL range, if a range.

- line limits
- boat limit
- annual angler limit
- vessel trip limit
- bag limits
- super-exclusive registration
- sport catcher vessel only area
- sportfish reserve
- rod permit
- possession limits
- prohibit crew-caught fish

The Council has identified 11 management measures that could adjust harvest in an effort to maintain the charter fishery within the allocation provided under a GHL. Each of these tools has a different effect on harvest potential. This effect will likely vary between areas, and perhaps ports, and will be influenced over time by changes in stock abundance. Each tool must be continually evaluated in context of the level of action required, the stock abundance, and the regulatory area. Market factors such as participation levels and willingness to pay for the opportunity to sport fish for halibut will also influence future harvest potential and was considered by the Council in its recommendation of a preferred regulatory strategy.

Determination of the best management measure or combination of measures to use was based on the best, most current information available. For this reason, it is preferable to make a list of tools available from which a manager may select one or more of the tools listed. Implementation and timing of a procedure for implementing GHL management measures is discussed in Section 4.6.2.2.5.

Bag limit

The current bag limit set by IPHC regulations is defined as "the maximum number of halibut a person may take in any calendar day from Convention waters." In all waters off Alaska, the daily bag limit is two halibut of any size per day per person.

On-site sampling by ADF&G is based on vessel-trip, rather than individual angler, interviews. Due to the nature of the survey, a party-fishing environment had to be assumed for this analysis. For example, if six clients were fishing and six fish were landed, the analysis assumes that each person harvested one fish and no clients exceeded a one-fish bag limit.. However, it is possible that three clients may have harvested all of the fish, meaning three of the fish would have been in excess of the one fish bag limit. Therefore this method of calculating the impacts of a one-fish bag limit will tend to underestimate the true impact.

With the above caveats to the data, the analysis determined that 61% of halibut retained in Area 2C and 57% in 3A resulted from the first fish in the two-fish bag limit (Tables 4.6.4 and 4.6.5). A reduction to a one-fish bag limit, would be expected to decrease harvest by 39 percent in 2C and 45 percent in 3A when examining SCVL data and 40% in Area 2C and 43% in Area 3A when examining ADF&G on-site interview data.

Table 4.6.4.- Percentages of sport charter harvest made up of first and second fish in the bag limit in IPHC Area 2C in 1998.

SWHS Area	Port Sampled	1st Fish	2nd Fish	Trips Surveyed(a)
Ketchikan	Ketchikan	61%	39%	101
Prince of Wales	Craig/Klawock	61%	39%	49
Petersburg/Wrangell	Petersburg/Wrangell	65%	35%	71
Sitka	Sitka	61%	39%	544
Juneau	Juneau	57%	43%	65
Total(b)		**61%**	**40%**	**830**

(a) - Only includes single day trips; trips occurring for more than 1 day excluded.
(b) - Weighted average to all of IPHC Area 2C.

Table 4.6.5.- Percentages of sport charter harvest made up of first and second fish in the bag limit in IPHC Area 3A in 1998.

Area	Port Sampled	1st Fish	2nd Fish	No. Trips Surveyed (a)
Yakutat	none	--	--	--
Prince William Sound	Valdez	63%	37%	122
North Gulf	Seward	63%	37%	112
Lower Cook Inlet	Homer	53%	47%	375
Central Cook Inlet	Deep Cr. / Anchor Pt.	58%	42%	221
Kodiak	Kodiak	64%	36%	293
Overall Area 3A (b)		63%	47%	1123

(a) - Only includes single day charter trips; trips occurring for more than 1 day excluded.
(b) - Overall estimate weighted by the proportion of harvest in each area, ignores Yakutat due to lack of data.

(Table 4.6.6). Also, the reduction in weight may be overestimated because under a one-fish bag limit, anglers may keep larger fish.

Table 4.6.6. Projected reduction in 1998 charter halibut harvest as a result of a reduction in bag limit to one fish per angler. (Source: ADF&G SCVL and on-site interviews)

Area	percent in fish	number fish	pounds net wt	charter anglers
2C	39-40%	25,000	689,000	45,800
3A	43-45%	69,000	1,380,000	91,000

Fish in excess of the one-halibut bag limit that could not be attributed to a specific port, but likely came from either Area 2C or 3A, totaled 1,365 fish. These halibut amounted to an additional loss to charter anglers of roughly 35,000 lb. Total foregone harvest of halibut under a one-fish bag limit in both areas amounted to approximately 2.1 M lb under these projections based on 1998 data. Note that only single day trips were used in this analysis—all multi-day trips were excluded.

The above estimates do not take into account any possible changes in effort or angler behavior due to the reduced bag limit. For example, a one-fish bag limit could have a greater effect on reducing harvests than estimated if anglers are less willing to take such a trip at the same cost as a trip with a two-fish bag limit.

Recall that a bag limit would only be imposed on the charter fleet (by area) once catch reaches or exceeds the GHL set for the area. Projections of when the GHL may be expected to become constraining on the charter fisheries are presented in Chapter 3. Those projections are recognized to be very rough approximations, since their derivation was dependent on several factors that were highly variable. However if those projections are assumed to be realized, the 2C bag limit (if approved by the Council) would go into place either immediately upon implementation of the program, since the GHL has already been reached, or as far out as 2004. In Area 3A, imposition of a bag limit would occur immediately or by 2003, depending on the GHL alternative selected.

Whether or not a bag limit will result in harvest reductions depends on several factors such as the magnitude of the limit, whether or not the limit is constraining on catch (Hunt 1970), whether or not the bag limit alters the catch expectations of anglers (i.e. is the number of fish that can be caught and kept important or is the fishery primarily a catch and release game fishery?), and changes in the demand structure of sport fishing such as an increase in the sport fishing population (Table 4.6.7). Depending on the combination of the above factors, there is a very real possibility that a bag limit will have no visible effect on harvests or that harvests will even increase after implementation of a limit. For example, assume a limit is set at a level where the perceived quality of the average trip is not altered, so that we wouldn't expect participation rates to decline. Also assume that the bag limit effectively constrains the catch of just a small percentage of anglers ('highliners' of the sport fishery who catch much more than the average), and that the visitation rate to the fishery region is increasing over time. While the few very successful anglers will experience a reduction in harvest, those fish not caught by 'highliners' may be caught by the remaining fishers and new entrants. In this scenario, the bag limit merely redistributes catch over the entire population of anglers instead of reducing the harvest. However, this does result in a welfare change.

Table 4.6.7. Estimated percentage of total harvest reduction, by month, through implementation of a one-fish bag limit in Area 2C during 1998 and 1999. (Source: SCVL)

	Area 2C		**Area 3A**	
MONTH	**1998**	**1999**	**1998**	**1999**
MAY	2	1	5	4
JUNE	12	10	14	13
JULY	14	14	17	16
AUGUST	10	14	7	10
SEPTEMBER	1	1	1	2
TOTAL	39	40	44	45

Unfortunately, studies on the effects of bag limits seem to be sparse in the literature. Titles and abstracts to a few selected works on bag limits for both fish and game were provided by the Washington Department of Fish and Wildlife, though time constraints did not permit obtaining the works in question. Nonetheless, some of the abstracts do confirm reductions in harvest after the imposition of bag limits, though at times less than anticipated (Hunt 1970, Attwood and Bennet 1995).

Catch and effort data for particular fisheries can also be used to assess the effects of bag limits before and after their implementation, though analysis of such data is complicated by the confounding effects of substitution when there are multiple species that can be targeted on similar trips or overlapping seasons for

different fisheries. Apparent changes in effort that follow a change in the bag limit have to be identified as either a participation effect or some unrelated demand change for meaningful interpretation of harvest results.

Data and cursory analysis on the coastal black rockfish fishery, obtained from the Washington Department of Fish and Wildlife, suggest that bag limits imposed in 1992 and 1995 had limited success in reducing harvests for trips launched from some ports, and no success at all in others. However, since black rockfish are often incidentally targeted during trips that are primarily motivated by the salmon sport fishery, these results need to be further analyzed to be conclusive. Furthermore, the bag limit reductions (15 to 12 in 1992 and 12 to 10 in 1995) do not seem to be extreme enough to have provoked a participation effect on anglers.

Bag limit reductions implemented within a management plan have been used to reduce or limit harvests in the Southeast Alaska sport fishery for chinook salmon since 1992. These bag limit reductions have been used in conjunction with other regulatory changes to try to obtain an allocation to the sport fishery. Although CPUEs for chinook salmon are usually substantially poorer than those observed in the guided halibut fishery, a reduction in the chinook bag limit from 2 fish to 1 fish had a substantial impact on reducing or limiting harvest. In 1992, the imposition of a one-fish bag limit reduced the harvest of "treaty" chinook salmon by an estimated 7,220 fish (about 17%). No increases in fishing effort were observed which might have at least partially offset the reduction in bag limit. Bag limit reductions for at least a small portion of the fishing season have been used annually since 1992 to limit harvests of chinook salmon in Southeast Alaska. If placed into effect for the entire fishing season, bag limit reductions have been estimated to reduce harvests from about 12% to 22%.

While there is no data known to the authors to allow direct estimation of effort changes resulting from a one-fish bag limit for halibut in Areas 3A and 2C, we can predict how anglers fishing off the Kenai Peninsula might respond to changes in expected catch using Lee's participation rate model (described earlier in Chapter 4). The participation rate model provides information on how changes in the expected number of fish caught affects the probability that anglers will take a fishing trip. The model is based on the expected number of fish caught (without differentiating between fish kept and released), and the data does not allow us to distinguish between kept and released fish, so it cannot be used to explicitly analyze a reduced bag limit. However, since it describes how catch rates affect participation, an illustrative application is relevant in the absence of any other demand analysis for sport caught halibut.

The value associated with total catch includes the value of catching and keeping halibut for meat (which is not necessarily valued in the same way as halibut meat purchased from commercial sources) and the value that corresponds with the experience of catching and releasing. These values are subsumed within the survey responses on which the model is based, and reflected in the participation rate model's results despite our inability to distinguish between both types of value. While it is not possible to distinguish between fish caught and released, the model is still useful for illustrating that a strong relationship exists between the total expected catch of halibut and the desirability of taking a halibut trip, a relationship that will play an important role in determining how anglers ultimately respond to a reduced bag limit. Furthermore, given certain assumptions, scenarios can be formulated that are likely to bound the range of a bag limit's effect on participation in the Kenai Peninsula's halibut fishery. Since survey results upon which this model is based apply only to Kenai Peninsula anglers, we cannot use the model to make inferences for the halibut sport fisheries in other areas.

A reduction in the bag limit from two to one fish decreases the quality of a halibut trip assuming that there is some value to the average angler of keeping fish. One way to approximate such a reduction in quality, given that we do not currently have data on consumer preference for retaining halibut, is to model for an expected total catch reduction of one fish, assuming that keeping halibut is of considerable overall value to the fishing experience. In cases where the expected total catch is greater than two fish after we simulate a

reduction of one fish from expected total catch (recall that we are using the number of fish caught as a proxy for the number of fish kept in this model), then we can assume that the resulting participation effect will not be as severe as the participation effect following imposition of a one-fish bag limit. This is because anglers can still keep at least two fish. This is obviously a weakness of falling back on using expectations of total catch instead of retained catch. However, unless the catch and release component of the fishery is much more valuable than the keep component, we can view the effects of a simulated reduction in expected catch by one fish as a probable upper bound for the decreased participation that would follow a bag limit of one fish.

Similarly, we can assume a lower bound of participation decrease for a one-fish bag limit by modeling for a reduction in halibut catch from the current average levels to just one fish. This hypothetical scenario implies a much more drastic reduction in the quality of the trip than does the imposition of a one-fish bag limit because it does not allow for any catch and release activity subsequent to landing the first fish. Therefore, it will likely overstate the decrease in participation resulting from a one-fish bag limit by a very considerable amount, and serve as an absolute lower bound on the corresponding participation decrease.

Average attribute levels were selected for halibut-only trips to predict the effect of halibut catch reductions on participation in the halibut fishery. A limitation of the model is that the catch constraint can only be applied to the average saltwater angler, and not specifically to halibut charter clients. This prevents us from being able to speak to the substitution of private boat fishing for charter fishing and could lead to an overstatement of charter client responses to reduced catch. However, we can approximate the type of response that would be more characteristic of a halibut charter trip by applying the catch reductions to a baseline that reflects halibut charter trips. Table 4.6.8 reproduces the attribute means from the Lee survey data for halibut-only charter trips.

Table 4.6.8 Mean attribute levels for Kenai halibut-only charter trips

	Residents	Non-residents
Fishing Cost	141.30	207.93
Halibut Catch (kept & released)	3.61	3.45
Halibut Weight	33.54	43.51

Average total catch for Kenai Peninsula halibut-only charter trips elicited from the 1997 Lee survey was 3.61 halibut per resident angler day and 3.45 for every non-resident angler day. Reducing the average catch values by one fish, resulting in an expected catch of 2.61 halibut (28% reduction in catch) and 2.45 halibut (29% reduction in catch) for resident and non-resident angler days respectively, we can predict how this decrease in expected quality will affect the likelihood that anglers will take the trip. Resident participation is estimated to decrease by 18.7% and non-resident participation by 26.3% (see Table 4.6.9). These point estimates are very sensitive to the attribute levels selected, and there is likely to be considerable overlap in the confidence intervals between values for residents and non-residents, meaning that the true values may not be statistically different.

Decreasing total expected catch levels for both residents and non-residents to only one halibut per angler-day (72% and 71% reductions for residents and non-residents, respectively) reduces participation rates by 92.8% for residents and 90.5% for non-residents (see Table 4.6.9). This is a dramatic reduction and it is important that the result is not misinterpreted. Rather than represent an expected effect of a one fish bag limit, the result merely means that there is about a 90% reduction in the likelihood that the average angler would take a trip if she only expected to catch one halibut, all else being equal. This is not an unreasonable expectation, recognizing that, by assumption, there would be no more opportunity for fishing of any kind (catch and release included) after the first fish is caught.

Table 4.6.9 Predicted angler response to changes in halibut catch

	Decrease in resident participation	Decrease in non-res participation
Catch reduced **by** 1 fish per angler day	18.7%	26.3%
Catch reduced **to** 1 fish per angler day	92.8%	90.5%

The reductions in participation implied by this illustration do not necessarily mean that anglers will drop out of the halibut charter fishery altogether. Among the many activities anglers can substitute for a foregone halibut trip off the Kenai Peninsula is a halibut trip anywhere else where the constraint on catch isn't expected. Therefore, these participation reductions only represent a decrease in halibut sport fishing off of the Kenai Peninsula, which could be offset by a spillover effect elsewhere.

We can estimate the monetary economic impacts of the above simulations to the Kenai Region using the input-output model presented in Chapter 4. Since we can assume that anglers would substitute their Kenai Peninsula halibut trip with some other recreational opportunity, either within or outside the Kenai region, it would be best to incorporate substitution effects to the extent practicable before predicting the regional economic impacts of changes in catch. Since some of the reduction in effort inferred in Table 4.6.11 is likely to spill over into other saltwater fisheries in the Kenai, the changes in fishing-related expenditures will be less pronounced than if all substitution occurred outside of the Kenai. To allow for substitution of other saltwater fishing opportunities such as salmon or combination trips, catch and weight means for all marine sport fishing trips were used so that the model results reflected the full range of trips an angler could take. This reduces overstatement of the local impacts by capturing the spillover effect that a reduced expected catch of halibut would have on other types of locally available saltwater fishing trips. Tables 4.6.10 and 4.6.11 report the means of saltwater fishing trip attributes and resulting impacts, respectively.

The lower bounds for predicted participation decrease are close to 80% for residents and 75% for non-residents. We can assume that the difference between these results and those that are in the 90% range that reflect the lower bound in Table 4.6.9 comprise the substitution effect of taking another type of saltwater trip off the Kenai rather than a halibut-only trip. The upper bound under the latest simulation closely resembles that of the simulation reported in Table 4.6.9. Though it is not intuitively clear why both residents and non-residents seem to respond more sensitively to reduced catch by one fish when there are substitutes available, the answer probably lies in the high degree of influence imparted by changed attribute levels.

The regional impacts to the western Kenai Peninsula corresponding to the simulated changes in expected catch fall within the following ranges: a $3,407,633 decrease in fishing expenditures attributable to halibut charter fishing to $11,949,103; a $5,959,856 decrease in subsequent total output (sales), inclusive of the decreased expenditures, to $17,413,928; a $2,372,716 decrease in personal income to $6,939,406; and a decrease of 192 jobs, to 562. These values are based on preliminary input-output runs, and it should be noted that the reductions in halibut catch were modeled holding all other variables constant. The inward shift in demand for halibut trips implied by the decreased participation rates would likely have a price effect that would mitigate the drop in participation assuming the supply of trips is not perfectly elastic. However, this mitigating effect is not captured in the above estimates. The reader is reminded that these values are not measures of net benefits, but instead impacts caused by changes in monetary transactions. Monies not spent in the Kenai as a result of catch reductions would likely flow to other regions where the expected catch is not as constraining, as recreationists seek out the next best fishing opportunities.

Even though the participation rate model's results exhibit the expected trait of decreasing marginal utility for catch, the impacts and changes in compensating variations provided above are estimated under the assumption that marginal utility is the same for catch and release fish as it is for fish that are caught and kept.

While this is an unrealistic assumption, it is not inappropriate for constructing an absolute lower bound of effort change in the absence of a method for distinguishing the keep and release elements. It is, however, problematic in that the lower bound is one that almost certainly overstates the true effect of a bag limit of one fish. As noted previously, this is because the scenario modeled is one that more drastically constrains the quality of the average fishing trip for halibut. Ideally, the effects of the keep and release components could be used to construct a piecewise marginal utility function where marginal utility after the first fish caught could be made to resemble the shape of marginal utility after the second fish caught based on the current bag limit of two fish. Time constraints did not permit us to manipulate the participation rate model in time for the release of the public review draft of this document, but staff was able to attempt this exercise for presentation at the February 2000 Council meeting. The following text was contributed by Dr. Todd Lee, NMFS AFSC, which details modifications to the participation rate model.

Table 4.6.10 Mean attribute levels for all Kenai saltwater fishing trips

	Residents	Non-residents
Fishing Cost	131.40	190.34
Halibut Catch (kept & released)	3.16	2.95
Halibut Weight	33.93	43.97
King Catch (kept & released)	0.22	0.15
King Weight	25.37	31.79
Silver Catch (kept & released)	0.12	0.22
Silver Weight	10.00	10.38

Table 4.6.11 Predicted angler response to changes in halibut catch and resulting impacts taking substitute fisheries into consideration.

				Monetary impacts		
	Decrease in resident participation	Decrease in non-res participation	Decrease in expenditures	Output	Income	Employment
Catch reduced **by** 1 fish per angler day	20.1%	28.1%	3,407,633	5,959,856	2,372,716	192
Catch reduced **by** 1 fish per angler day	79.7%	75.2%	11,949,103	17,413,928	6,939,406	562

This explains how upper and lower bounds may be placed on the effect of changing the halibut bag limit from two (2) to one (1). The reason why only bounds can be estimated is that the data were collected under the current bag limit regulations of two (2) fish per day per licensed angler. I should point out that the bounds I present are based on logical constructs, rather than statistical sampling theory (i.e., they are not statistical confidence limits).

In order to construct bounds some assumption must be made about the effect of the regulation on the catch rate. Your GHL analysis states that the 1997 average catch per day per angler for charter trips is 3.61 for Alaska residents and 3.45 for non-residents. To demonstrate the range of possible outcomes I will discuss and calculate bounds under two different assumptions or scenarios: (1) the total catch remains constant; and (2) the total catch decreases by one fish per day.

It is interesting to note that if the marginal utility of catch is constant the problem is greatly simplified. Under this assumption, the utility derived from catching additional fish is constant, and consequently, the marginal utility of keeping equals the marginal utility of releasing. If this were true, then it is possible to directly calculate the correct point estimate under each the above scenarios. However, the results from my working paper[1] strongly suggest that the marginal utility of catch is decreasing in catch. We therefore must investigate placing bounds on the point estimate.

I will use Figure 1 to demonstrate the bounds you used in the GHL analysis, how those bounds relate to the two catch rate scenarios, and how those bounds may be improved. Suppose that the estimated, conditional, indirect utility of halibut catch has been estimated and is the curve 0Y. This function is conditional since it depends on the levels of other relevant variables like fish size and trip cost. The utility function depicts the decreasing marginal utility of catch result discussed above. The results of course apply to any utility function that is concave in catch. By way of example, assume that an angler catches three (3) halibut per day before the keep limit is reduced.

The utility of catching and being allowed to keep 1 fish is d. The utility of catching and being allowed to keep 2 fish is b. The utility associated with catching three halibut (catching and being allowed to keep 2 fish, and catching and releasing 1 fish) is a. Thus the marginal utility of catching and releasing 1 fish conditional on catching and being allowed to keep 2 fish is $a - b$. You established the upper bound by measuring the quantity $-(a - b)$ for the appropriate initial catch, and translating it into a change in probability using the link function I provided in the working paper. This is clearly an upper bound for the scenario where total catch is reduced by one fish. It measures the marginal utility of a fish the angler must release, rather than the marginal utility of a fish the angler is allowed to keep (given that they would both be the second and last fish caught). Also note that if the marginal utility of catch were constant this would provide the correct measure of the change in utility associated with a 1 fish reduction in the bag limit (under the scenario that total catch is reduced by one fish).

You established the lower bound by decreasing catch to 1 fish. Assuming again that the angler's catch was initially 3 fish, the change in utility is $-(a - d)$. This is clearly a lower bound under both scenarios, an overstatement of the effect of a 1 fish bag limit, since it measures the effect of (1) reducing the number of fish that an angler catches and is allowed to keep by 1 fish; and (2) reducing the number of released fish to 0.

I will now describe a better method to measure the lower bound. This method is "better" because it provides a smaller overstatement of the effect. I will first show this for the second scenario where total catch remains constant. The bound is constructed by assuming that the marginal utility of catch-and-release fishing is independent of whether an angler is allowed to keep 1 or 2 fish. Under this assumption a new utility function (0Z) can be constructed by moving the line segment XY in a southwesterly direction until it intersects with

point W. This is equivalent to removing the second fish caught that the angler was allowed to keep, the line segment WX. Now, for example, an angler who catches 3 fish is allowed to keep 1 of the fish and must release the other two. The angler would receive a utility level equal to ***c***. The change in utility is therefore -(***a*** - ***c***). This is almost certainly still a lower bound however since it is extremely likely that the marginal utility of catching-and-releasing is a decreasing function of the number of fish an angler is allowed to keep. It is interesting to note that if this is not the case (i.e., the marginal utility of catching-and-releasing does not depend on the number of fish caught and allowed to keep), -(***a*** - ***c***) is an exact measure of the change in utility. A special case of this would be a utility function that is linear in catch. Under this condition this lower bound provides an exact measure of the change in utility.

A lower bound under the first scenario (total catch is reduced by 1 fish) is measured by the reduction in utility from the initial position, ***a***, to where the angler is allowed to keep one fish and release one fish. This utility level is given by ***e*** in Figure 1. Thus -(***a*** - ***e***) is the lower bound. Like the previous case, this is almost certainly a lower bound since it is extremely likely that the marginal utility of catching-and-releasing is a decreasing function of the number of fish an angler is allowed keep. Otherwise, this too is an exact measure.

The last bound that remains to be constructed is an upper bound for the scenario where total catch is unchanged. Establishing this upper bound takes a slightly different approach. I will examine the magnitude of two different marginal utilities. The first is the marginal utility of catching and being allowed to keep a fish conditional on having already kept one fish. The second is the marginal utility of catching and having to release a fish conditional on having already kept one fish. It is almost certain that the former is larger in magnitude than the latter. It therefore follows that replacing the former with the latter in the utility function will provide an upper bound to the effect of the regulation. This can be shown graphically (though I don't to avoid too much clutter) if you imagine that line segment VY is copied and moved in a southwesterly direction until it meets point X. The difference between this new utility function and ***a*** is the measure of the change in utility.

I have estimated the new lower bounds and an additional upper bound using the average characteristics of Alaskan and non-Alaskan anglers as defined in my working paper[5], and using the catch, size, and price attributes you reported in your analysis. These are contained in Table 1. Please note that these estimates are based on average angler characteristics and do not follow the sample enumeration method. From my experience with this data and model the difference is quite small, but should be noted nevertheless.

[5] Lee, S.T., M. Herrmann, K. Criddle, and C. Hamel. 1999. *The Effect of Fishery Attributes on Participation Rates: the Kenai Peninsula Marine Sport Fishery* . Working Paper. November.

Table 1. Calculated bounds of the change in participation rate under different scenarios.*
* from NPFMC GHL analysis

	Upper Bound	Lower Bound
Total Catch Unchanged		
Resident	-7.5%	-66.2%
Non-Resident	-8.2%	-59.4%
Total Catch Reduced by 1 Fish		
Resident	-18.7%*	-66.8%
Non-Resident	-26.3%*	-62.8%

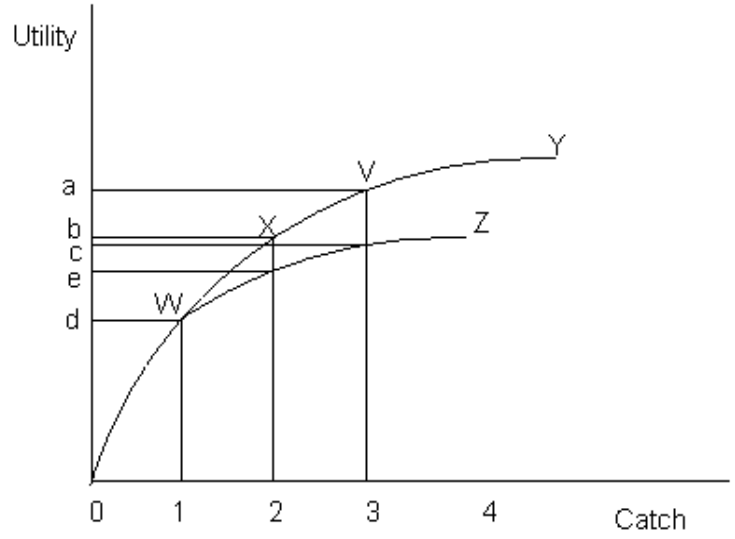


Figure 1. Utility of Halibut Catch

Angler net benefits associated with the loss of halibut trip opportunities can also be estimated by obtaining the changes in compensating variation associated with the participation rate change. The derivation for this process was explained earlier in Chapter 4. Recall from that discussion that the original compensating variation values were $61 and $59 per resident and non-resident angler day respectively, amounting to a total of $3,603,929 (based on the total number of angler days in the Cook Inlet halibut charterboat fishery for 1988). The reductions in participation for the first simulation, where catch was reduced by one fish, yielded average compensating variations of $34 and $28 per angler day for those resident and non-resident anglers that continue to partake in the fishery after the expected change in halibut catch. New measures of effort can be obtained by reducing the number of original angler days in the fishery (from Table 3.44) by the percentage of participation rate change. For residents, the number of angler days is 16,779 less 18.7%, or 13,658, and for non-residents it is 43,700, less 26.3%, or 32,207. Multiplying the compensating variations above by the resulting change in effort produces a total of $1,366,151, a 62% reduction in angler net benefits.

Since participation decreases in response to expectations of reduced catch, angler surplus will decrease and the reduction in total expenditures translates to reduced revenues to the charter sector. Holding price and all other attributes constant, net benefits from the halibut charter market would decrease since both consumer and producer surpluses diminish. Again, it is noted that there would likely be price effects to offset the extent

of participation reduction, but this cannot be estimated without a supply function. While reduced harvests by the sport sector increases the benefits to the commercial halibut sector, we do not know how offsetting these effects are. Though we can't speak to net benefits in the commercial market without better information regarding demand at the consumer level, the elastic nature of the ex-vessel demand (presented in Section 3) implies that reductions in the commercial catch would reduce total revenues to commercial harvesters. While we can conclude the obvious offsetting effects of net benefits to each sector, determining orders of magnitude requires more analysis.

Estimates have been provided earlier in this section for the impacts of decreasing the bag limit from two to one fish, in 1998, assuming there would not be any change in participation levels. Table 4.6.6 showed the projected reduction in harvest to be 43%. However, this reduction does not take into account the reduced effort effect of imposing the bag limit. If we assume that halibut anglers throughout Area 3A react similarly to reduced catch expectations as do anglers on the Kenai Peninsula, then we can conclude that there will be some reduction in effort, and that consequently the reduction in harvest will be greater than the 43% estimated earlier. It would not be appropriate to apply the participation reductions above on an area-wide basis, however, without a better understanding of anglers' motivations elsewhere in Area 3A.

Because the participation rate model cannot be appropriately applied to Area 2C, no quantitative projections are provided. Though we can reasonably assume a participation effect of some sort, the magnitude depends on angler usage patterns. If the preponderance of anglers for a particular port are cruise ship passengers for whom saltwater fishing is an ancillary part of the Alaska vacation experience, as confirmed by McDowell (1992), and if these clients do not place an emphasis on the "meat" value of the fishery, then they will probably not be as sensitive to a reduced bag limit so long as other fishing attributes do not change. Informal discussions with charter operators in Area 2C indicate that cruise ship passengers do make up the bulk of the clientele in many ports and that combination halibut-salmon trips are much more prevalent than are halibut-only trips, which would further complicate isolating impacts of changes in the halibut fishery. It should also be noted that these characterizations do not hold for lodges that focus primarily on saltwater fishing, since the primary purpose for this type of a trip is likely fishing, and the respective clientele may place a greater emphasis on fish kept than the average cruise ship passenger. If this were true, the impacts of a bag limit would vary among charter operations depending on what could be a narrowly defined market from port to port. Because the reasons for fishing and substitute opportunities are different in 2C than they are in 3A, the curvature of a participation rate model for Southeast may be quite different from one for Southcentral. Public testimony from members of the commercial and recreational industries suggest that there is a wide range of opinion about whether Southeast participation rates would be more or less sensitive to changes in target species abundance or bag limits than Southcentral anglers.

There are allocative implications of imposing a bag limit that would limit the charter sector to about half of a proposed GHL. The magnitude of the allocative aspects depends on how the uncaught fish are distributed between the commercial and charter sectors. The difference between the actual charter harvest in an area and the GHL could either be harvested by the commercial sector or banked by the charter fleet, under the range of alternatives being considered. If the fish are banked this would allow the charter fleet to remain under the GHL for a longer period of time. However, given that the one-fish bag limit reduces the charter harvest well below the GHL this would likely not be an issue for several years. The other option would be to allow the commercial sector to harvest the fish not taken by the charter sector. This reallocation would increase the gross revenues of the commercial sector at the expense of the charter fleet. Gross revenues would be expected to increase for the commercial sector if the bag limit is projected to reduce the charter fleet below their current harvest levels and the commercial fleet is assumed to face elastic demand. The charter fleet would be worse off because of the decreased demand for charter trips.

Regional impacts would also be different across both areas for given changes in participation. With less than 10% of the state population scattered across an area whose population centers are not linked by a road system, Southeast has a comparatively smaller economy with limited ability for money to cycle locally. Southcentral, on the other hand, has access to well over 70% of the state population connected via a road system, as well as active airfreight hubs. Given these differences, it would be inappropriate to examine the local economic significance of Southeast's charterboat industry by extrapolating from the Kenai Peninsula input-output model.

Boat limit

The Council defined a boat limit as "50% or 100% of a collective bag limit." Such a boat limit would institute a collective or "party" limit of halibut harvests that is contrary to current legal definitions of bag limits, which are defined on an individual angler basis. A boat limit would restrict the number of halibut legally landed on a halibut charterboat in a given day (midnight to midnight) based on the sum of the number of anglers multiplied by the individual bag limit. If the Council were to adopt such a boat limit, a similar change would need to be adopted by the IPHC for a change to its regulations.

Under the proposed action, a boat limit would limit the harvest of six anglers on a charterboat, for example, to a maximum of either 12 halibut or 6 halibut, under the current 2-fish/person/day bag limit. Should the Council opt to add an option for some level between 50% and 100% of the collective bag limit to, for example, 10 halibut, a likely scenario is that anglers would voluntarily limit themselves to five anglers per boat, so that all anglers could take home the maximum number of fish allowed under the bag limit..

The premise of the proposed GHL measure is that the boat limit would act as a *de facto* bag limit, based on the Council's definition. The intent of its use would be to enact similar effort controls as projected under a reduction of the bag limit to one halibut (50% of the bag limit) as summarized in Table 4.6.6. Contrary to providing further limitation on halibut charter harvests, however, the option for a boat limit equal to 100% of the bag limit could result in additional halibut harvests. Currently, anglers are legally limited to what they individually harvest (although in practice it is sometimes illegally ignored). Individuals who are unable to harvest their bag limit, go home empty-handed. Under a "collective" bag limit, successful fishermen could harvest the bag limit of less successful fishermen, resulting in more halibut removed than currently allowed. Thus, it appears to be a less effective management tool than bag limits for the purpose of reducing charter halibut removals.

Logbook data matched with average net weight of charter fish by port (Table 3.5(b) and 3.13(b)) is an estimate of the biomass associated with these foregone fish (Table 4.6.6). These numbers generally agree quite well with the estimates from on-site interviews. One difference is that the logbook data were analyzed to show the amount of the harvest that was made up of all fish in addition to the first fish (or "Other fish") rather than just second fish. This was done because it was not unusual for the number of fish harvested to slightly exceed twice the number of clients in the 1998 logbook. ADF&G staff believe that many operators recorded fish harvested by the skipper or crew but did not record the skipper or crew effort. This could cause a small bias in the estimates of the effect of a bag limit reduction, but the bias would be small compared to other sources, such as uncertainty associated with changes in angler behavior under a one-fish bag limit.

A boat limit would restrict an individual's harvest in the same manner as a bag limit, under the boat limit definition used in this analysis. Bag limits considered in this analysis were either one or two fish per person per day. The boat limits under consideration would result in the same amount of halibut being harvested on a trip as the bag limit alternatives. Charter clients would be allowed to, on average, harvest between one and two halibut per day. Estimating the economic impacts of this boat limit would simply be repeating the calculations that were made under the bag limit section, unless some other definition of a boat limit was

adopted. Therefore, the reader is referred to that section when considering the economic impacts of the proposed boat limit.

Vessel trip limit

The Council defined a vessel trip limit to be one boat limit in a 24-hr period. Since the boat limit is based on the bag limit, the analysis for this measure is also based on the bag limit analysis described in 4.6.2.2.1. The intent of a trip limit would be to prohibit vessels from making more than one trip each day. Using 1998 SCVL data, only 4% of trips were determined to be the second trip a charter vessel took in a day in both Areas 2C and 3A.(Table 4.6.12). Multiple day (or overnight) trips that are marketed to allow anglers to harvest two daily bag limits would be unaffected by a change to boat limits as proposed. Thus, it is not expected that a vessel trip limit alone will have a significant impact on keeping the fleet below the GHL. Further, this type of limitation would require a method to monitor trips to ensure conformance to the requirements, such as a check-out/check-in requirement. The mandatory charter logbooks also could be relied upon for compliance monitoring. If an average trip results in an average harvest, then a vessel trip limit may result in a harvest reduction of 4%.

Table 4.6.12. Frequency distribution of trips by number of trips per day fished for 1998.

	SWHS Area	Single Trip/day	%	2+ trips/day	%	Total trips	multiday trip
Area 2C	Ketchikan	1,100	87.03%	164	12.97%	1,264	171
	Prince of Whales Island	3,717	94.51%	216	5.49%	3,933	299
	Kake, Petersburg, Wrangell, Sitka	1,100	99.55%	5	0.45%	1,105	126
	Sitka	4,887	97.60%	120	2.40%	5,007	693
	Juneau	1,135	98.70%	15	1.30%	1,150	99
	Skagway	21	77.78%	6	22.22%	27	0
	Haines	63	95.45%	3	4.55%	66	0
	Glacier Bay	431	98.40%	7	1.60%	438	92
	TOTAL 2C	12,454	95.87%	536	4.13%	12,990	1,480
Area 3A	Yakutat	669	98.24%	12	1.76%	681	0
	Prince William Sound	1,859	98.78%	23	1.22%	1,882	148
	West Cook Inlet	1	100.00%	0	0.00%	1	0
	Cook Inlet W. of Gore Pt.	10,385	94.77%	573	5.23%	10,958	48
	Cook Inlet E. of Gore Pt.	2,028	98.49%	31	1.51%	2,059	18
	Kodiak	1,413	97.05%	43	2.95%	1,456	124
	TOTAL 3A	16,355	96.00%	682	4.00%	17,037	338
	unknown	48	87.27%	7	12.73%	55	8
	TOTAL	16,403	95.97%	689	4.03%	17,092	1,826

In summary, it is not expected that a vessel trip limit, alone, will have a significant impact on keeping the charter fleet below the GHL.

Line limits

In 1983, the Board of Fisheries adopted a sport fishing regulation for Area 2C that states: "Not more than six lines may be fished from any charter vessel." This regulation was proposed by Southeast residents to act as a deterrent to the movement of large capacity charter vessels from Pacific Northwest states to

Southeast Alaska. The proposal was also supported by the existing charter fleet in Southeast, commercial user groups, and local residents who fish from their own vessels. Existing charter businesses supported the six line regulation because they all had small vessels that carried six or fewer clients at a time and they did not want the added competition from the larger boats that could carry more clients and charge a lesser fee per client. Commercial groups supported the regulation because they did not want to see large increases in the sport charter industry.

In 1997, the BOF adopted a companion regulation that stated the maximum number of fishing lines that may be fished from a vessel at any one time that is engaged in charter activities is equal to the number of paying clients on board the vessel. This restriction was placed on charter vessels fishing for all saltwater species in Southeast Alaska.

Line limits would restrict the number of lines legally fished from a charter vessel, but would not limit harvest of skipper a crew members on their own. That is because under line limits alone, the skipper or crew could fish when one or more of the clients were not fishing. Options of line limits of 4 - 6 lines in Area 2C were approved for analysis. Most Area 2C charter operators typically take 3-4 clients per trip. A GHL Committee member suggested that the Council may wish to consider grandfathering vessels who are Coast Guard-qualified to carry more than six passengers, but are currently limited under the 6-line State limit. This latter suggestion would be legally problematic, since it might result in conflicting State and Federal regulations.

Options of line limits of 6 to 26 lines in Area 3A were approved for analysis. In this area, the majority of halibut charters are licensed to carry six passengers, but some vessels can carry 16-20 or more passengers. A comprehensive list of vessels and their fishing capacity is not currently available. What follows is an anecdotal report of the charter vessels with higher client capacity. In Seward, two operators have several boats capable of carrying 16-26 passengers. Also in Seward, the U. S. Air Force[6] has three 43-ft boats that can carry 18-20 passengers, for a variety of bottomfish and halibut fishing excursions. The U.S. Army has a 54-ft boat that can carry 20-22 passengers and a 40-ft boat that can carry 14 passengers that travel outside Resurrection Bay where they can target halibut. In Kodiak, most charter vessels are 6-pack boats, perhaps six are 30 ft boats, and eight are 40ft-50 ft and can carry up to 18 passengers. The Valdez fleet consists mostly of 6-pack or smaller boats; six boats can take 8-12 passengers.

Because of such differences in the Area 3A charter fleet, the Council may wish to recognizes differences in the existing fleet and consider options under the proposed line limit action:

8. A maximum number of lines per vessel could be community-based and designed within a LAMP to recognize past and present participation of headboat and military charter vessels at specific ports.
9. A maximum number of lines could be set and current charter vessels could be grandfathered at the maximum number of rods fished, or an average number of rods fished, or some other formula, as verified in the ADF&G databases.

Potential changes to restrictions on line limits for Areas 2C and 3A were examined using 1998 SCVL data for all bottomfishing. A known issue is that many skippers did not understand that they were to record the maximum number of rods fished at any one time, so the estimates of the number of rods fished are in some cases very high (up to 60 rods per boat). Some charter vessels in Seward (particularly military charters), however, may take upwards of 20 clients per trip, and one trip reporting 27 rods fished on a trip was verified by ADF&G port samplers. It became obvious that this information was not adequate to estimate the effectiveness of line limits as a tool to reduce halibut harvests.

[6]Military vessels are not considered to be "halibut charter boats" and would not be bound by charter regulations. Therefore, line limits applied only to charter vessels would not apply to these boats.

A second attempt at determining the effectiveness of line limits indicates there is not a direct relationship between line limits and harvest reductions. A number of assumptions would be required to relate line limitations to vessel operator behavior. Some vessels might take more trips during a day, there could be a shift to more small vessels, or it might not be economical for some vessels to fish at all. Thus, while line limits may address local competition issues it may not act as a control for removals.

Table 4.6.13a lists bottom fish charter trips, which are being used as a proxy for halibut charter trips since halibut trips cannot be separated in the data from other bottom fish targets, by port and number of lines fished in Area 2C in 1998. Because all bottom fish trips are included the number likely overstates the number of halibut charters taken. Charter vessels in this area are currently restricted to 6-lines and further restricted to number of paying passengers under State regulations. The table is designed so that the reader can determine the number of trips that would have been affected if a change to a specific line limit were approved. If the Council chose to set a more restrictive line limit in Area 2C, to 4-lines for example, 1,642 trips (11% of total trips) would have been affected; an additional 810 trips would have been affected if the limit was 5 lines; and an additional 43 trips under a 6-line limit. Most likely, these trips would have occurred under the new limit depending on the accompanying economics of chartering under such limitation.

Table 4.6.13b lists similar data for Area 3A. A total of 14,501 trips fished 6 lines or fewer and 4,823 trips occurred fishing 6 lines in 1998. A total of 1,856 trips would have been affected if a 6-line limit had been

Table 4.6.13a. Frequency of vessel trips by number of rods fished for 1998.

	number of trips										
Total Bottomfish Rods	Ketchikan	Prince of Whales Island	Kake, Petersburg Wrangell, Sitka	Sitka	Juneau	Skagway	Haines	Glacier Bay	Total	Running Total	# trips eliminated under X line limits
1	79	28	33	110	35	2	2	13	302	302	14,634
2	575	572	276	840	257	5	18	130	2,673	2,975	11,961
3	189	958	321	1,042	322	6	12	111	2,961	5,936	9,000
4	459	2,275	557	3,196	602	8	20	241	7,358	13,294	1,642
5	85	125	114	376	73	4	7	48	832	14,126	810
6	51	307	70	241	39	1	6	52	767	14,893	43
7-51	9	5	2	18	3	2	1	3	43	14,936	0
TOTAL	**1,447**	**4,270**	**1,373**	**5,823**	**1,331**	**28**	**66**	**598**	**14,936**		

in place. Other line limits show a declining number of trips affected as the line-limit increases. Public testimony may provide additional guidance to the Council on whether line limits, and at what level, may be an appropriate management tool to restrict halibut charter harvests.

Prohibit retention of halibut by crew

The Council added consideration of a restriction that would set a maximum number of fishing lines that may be fished from a vessel that is engaged in charter activities *for halibut* that is equal to the number of paying clients on board the vessel. A similar restriction in Area 2C was placed on all saltwater charter fishing. The

Table 4.13b Frequency of vessel trips by number of rods fished in Area 3A in 1998.

	number of trips								
# of lines	Yakutat	Prince William Sound	West Cook Inlet	Cook Inlet W of Gore Pt.	North Gulf E of Gore Pt.	Kodiak	TOTAL	Running Total	# trips eliminated under line limits
1	5	13	0	49	6	69	142	142	16,516
2	59	181	0	628	68	322	1,258	1,400	15,258
3	141	208	0	1,039	111	298	1,797	3,197	13,461
4	198	416	0	2,406	289	486	3,795	6,992	9,666
5	106	324	0	1,781	288	187	2,686	9,678	6,980
6	129	639	0	3,343	536	176	4,823	14,501	2,157
7	1	47	0	203	23	27	301	14,802	1,856
8	0	65	0	172	34	30	301	15,103	1,555
9	1	56	0	87	15	8	167	15,270	1,388
10	0	85	0	137	27	2	251	15,521	1,137
11	0	12	0	98	44	1	155	15,676	982
12	0	22	0	139	64	2	227	15,903	755
13	0	5	0	59	45	1	110	16,013	645
14	0	10	0	62	52	3	127	16,140	518
15	0	5	0	82	50	0	137	16,277	381
16	0	15	0	91	58	0	164	16,441	217
17	0	5	0	28	17	0	50	16,491	167
18	0	3	0	21	14	0	38	16,529	129
19	0	0	0	14	14	0	28	16,557	101
20	0	1	0	13	33	3	50	16,607	51
21	0	0	0	2	6	0	8	16,615	43
22	0	0	0	5	1	0	6	16,621	37
23	0	0	0	4	0	0	4	16,625	33
24	0	0	0	6	0	0	6	16,631	27
25	0	0	0	4	0	0	4	16,635	23
26	0	0	0	0	0	0	0	16,635	23
27-60	1	2	0	18	2	0	23	16,658	0
TOTAL	641	2,114	0	10,491	1,797	1,615	16,658		

Council is only considering measures to restrict halibut charter activities under Alternative 2. Such a restriction on only halibut, however, may be unenforceable since a crewman could state that he/she is targeting salmon or another saltwater species. This may be addressed by prohibiting any fishing by crew. If the Council approves line limits for only halibut in Area 3A, a similar line limitation for all saltwater chartering may need to be submitted by the Council to the BOF for consideration for those species (salmon, rockfish) under its jurisdiction in Area 3A to enhance enforceability; however, this may not just be justifiable on conservation grounds.

A limit of lines to paying customers only indicates that in Area 2C, halibut harvested by crew still totaled 451 fish in 1998 and 2,156 fish in 1999. For Area 3A, crew-harvested halibut increased from 1,738 fish in 1998 to 12,715 fish in 1999. An adjustment to the logbook form placed this question on the standard logbook page in 1999, rather than on the specific crew harvest form used. This is the likely explanation for the increased report of crew-harvested halibut in 1999. Assuming that the 1999 reports are more valid than those in 1998, the associated biomass with the numbers of fish reported in 1999 is (very) roughly 62,650 lb in Area 2A, and 266,000 lb in Area 3A.

In summary, a 6-line limit is currently in place in Area 2C. Nearly 90% of Area 2C charters took four clients in 1998. The Council may wish to consider the traditional passenger history of vessels in Area 3A if it adopts line limits. More restrictive line limits in each area would contribute to reducing halibut charter harvests in each area, by the level of additional restriction placed on each area. This must be balanced against the economic margin of profitability for vessels in each area. A decision to limit the number of lines to paying customers has a precedent in Area 2C, but is applied to all saltwater charter fishing. Expanding such a restriction to Area 3A may be unenforceable without BOF adoption of a similar restriction on charter fisheries within its jurisdiction. Another difficulty in predicting the effect of line limits is that they may result in a redistribution of anglers fishing from high-capacity vessels to lower capacity vessels. That is, anglers may avoid going on a vessel where their ability to fish may be restricted. That is, a fifth angler would choose to charter with another vessel under a 4-line limit, rather than have to "wait his turn."

Annual angler limit

This management measure would restrict the number of halibut retained annually by an individual angler. Currently, there is a daily bag limit for halibut but no overall annual limit. This action, like line limits on boats, can be imposed by regulation but will require the participation of enforcement to ensure compliance.

Most charter clients take either two or four halibut a year (Figure 4.6.4). A small percentage of avid anglers exceed four fish in a year. This information indicates that annual angler limits will have less impact on total halibut removals. It may result in significantly impacting the amount of halibut taken by a few fishermen, but have less impact on total removals because it does not address trip demand by anglers. In 1997, the Council decided to not pursue halibut possession limits as a separate action from charterboat management. In April 1999, the Council requested that analysis be brought forward for its review during initial review of this GHL analysis at the December 1999 Council meeting.

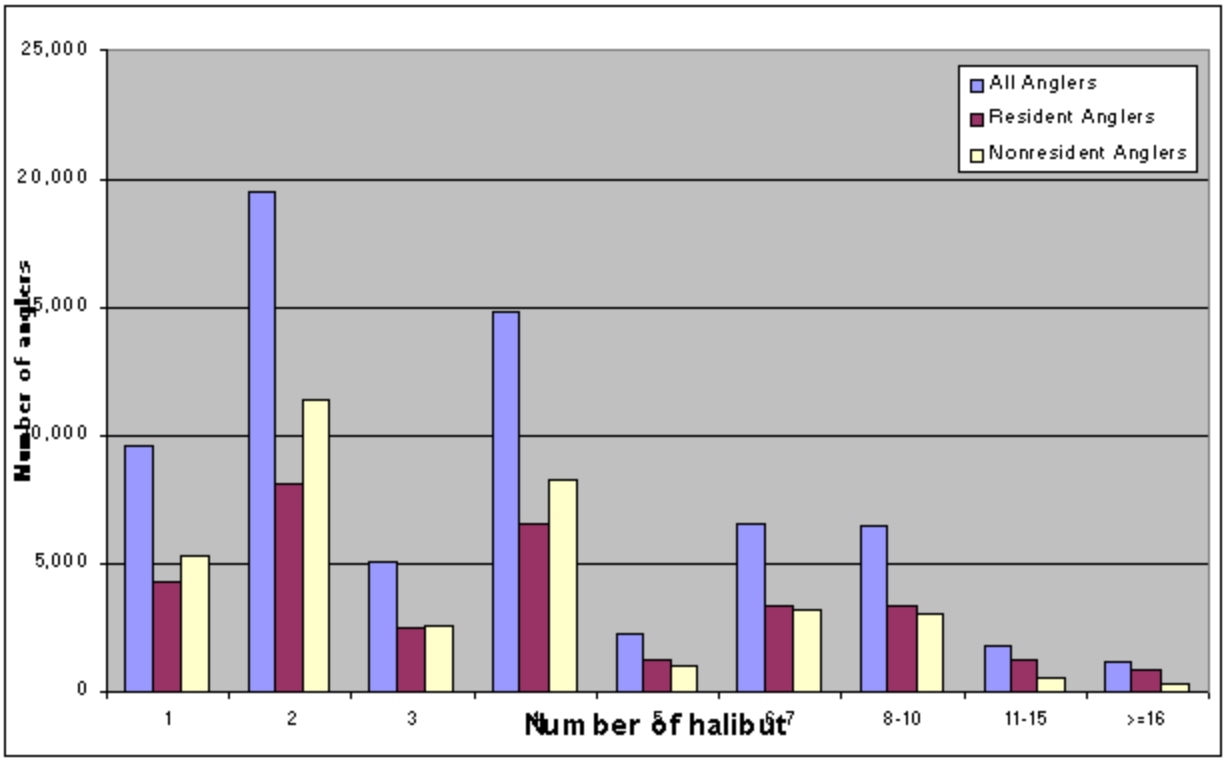


Figure 4.6.4 Number of Anglers Harvesting 'X' Number of Halibut

Super-exclusive registration

Super-exclusive registration would restrict a charterboat registered in one community or LAMP from operating in another community or LAMP in the same year. This action would redistribute fishing effort and removals but would not be expected to constrain halibut removals. It may, in fact, increase effort and removals because overcapitalization and overcrowding may motivate a particular charter vessel to relocate into a less crowded port. Relocation of charterboats, however, will not necessarily result in increased harvest unless the port they are moving to has excess demand.

This management measure would limit the area in which a vessel could operate. Super-exclusive registration could be season-long (i.e., once a vessel registers for an area, it could only operate in that area for the entire season) or only for the duration of the registration (i.e., a vessel can move to another area by changing registration area). Although this management measure may have some impact on harvest levels, its primary function would be to prevent user conflicts. Its most appropriate applications would be in LAMPs. (i.e., its adoption would not achieve the objectives of the proposed action).

The Board of Fisheries has adopted regulations that define a super-exclusive registration area, an exclusive registration area, and a non-exclusive registration area. These regulations are used to manage commercial salmon, herring, and crab fisheries in Alaska, mainly in western Alaska. The definitions are listed below.

1. Super-exclusive Registration Area: a vessel that has been validly registered to fish for a species in a super-exclusive registration area may not be used to take the same species in any other registration area during the same registration year.

2. Exclusive Registration Area: a vessel that has been validly registered to fish for a species in an exclusive registration area may not be used to take the same species in any super-exclusive registration area or in any other exclusive registration area during the same registration year.

3. Non-exclusive Registration Area: a vessel may be registered to take the same species in one or more non-exclusive registration areas and may be registered to take the species in one exclusive registration area, but may not be used to take the same species in any super-exclusive registration area or in more than one exclusive registration area during the same registration year.

These various registration area definitions have been used in management of commercial salmon, herring, and crab fisheries to prevent larger, faster vessels that are more efficient in harvesting from moving from one area to another during the peak of the seasons. This management tool works well with the more mobile commercial fishing fleets because they are not closely tied to as many shore-based infrastructure facilities.

Charter vessels are more closely tied to a specific homeport due to the nature of their business. In most cases, they have to advertise and book clients well in advance of the actual charter trip. Clients must make travel plans to a specific location, reserve hotel rooms at specific towns, etc. Charter businesses usually operate out of a single port where they have berthing reservations and have arranged land transportation for their clients to travel to and from the charter trip.

For example, in Area 2C during 1998, 78% of the active charter vessels reported one port of landing for the entire year, and 12% of the active vessels reported two ports of landing. The remaining 8% reported landing at three or more ports during the year.

In summary, super-exclusive registration for the sport charter industry would have very little effect on the current operating behavior of these fleets. Charter harvest will not increase without increased client demand, regardless of whether charterboat movement is constrained. Super-exclusive registration regulations would not be an effective tool in restricting halibut harvest but could be an important tool when utilized as part of local area management plans (LAMP) to address other issues such as competition or gear conflicts.

Sport Catcher Vessel Only Area

A Sport Catcher Vessel Only Area (SCVOA) has been proposed to protect locally designated areas for sport (charter and non-charter). It would redistribute fishing effort but is unlikely to reduce halibut removals. It may be a valid management tool to be included within a LAMP.

IPHC staff have suggested adding a similar alternative that would create specific fishing zones for different user groups. This approach could also be applied in the local area management plans. This option, similar to super-exclusive registration, would reduce user conflicts more than reduce harvest. Enforcement and monitoring would be the primary implementation concerns.

Sportfish reserve

The sportfish reserve was proposed by the charter industry as a reward program for past foregone halibut and is intrinsically linked to interpreting the GHL as an allocation. Under a reserve, in years when the charter fleet would not catch the amount allowed under the currently defined GHL, foregone charter halibut is *de facto* "granted" to the directed IFQ fishery in exchange for a possible future return grant to guarantee the charter season and bag limit for economic stability in the fishery. Under this action, unused allocations of halibut to the charter sector which are absorbed by the commercial sector would be conceptually reserved for future reallocations to the charter sector from the commercial sector in years of lower abundance when

the GHL would be met. In such times, additional allocation to the charter sector would likely be reallocated from the commercial sector, so as not to allow removals above recommended levels.

The halibut sportfish sector has been limited to a two-fish bag limit since 1974. Charter representatives maintain that charter harvest should not be reduced lower than needed to maintain the bag limit and season even under decreased halibut abundance. The industry has been willing to maintain the current bag limit even in times of greater abundance (as is currently the case). In return, the fleet is recommending that the Council implement the sportfish reserve. Effectively, the reserve is an alternative to the GHL concept since it eliminates the GHL in years when it would be invoked by 'reserving' and returning to the industry previously unharvested fish. Under the GHL, the commercial sector would gain in high quota years, but would lose some allocation in low quota years. If and when the halibut stock abundance declines to historical lows, then both sectors would be reduced. It is possible that faced with conservation concerns, season length and bag limits might then be affected.

The sportfish reserve, which has been linked with the April 1999 Alternative 2, to convert the GHL to an allocation, may have negative biological impacts since it likely would be invoked to increase charter halibut removals during years of lower halibut quotas due to lower halibut abundance. However, this impact would be mitigated if the reserve amount was redirected from the commercial sector's allocation, and not in addition to the commercial and charter quota. IPHC staff strongly recommends against harvest in addition to the quota. In years when the GHL is reached, it is effectively an allocation of 12.35%, under one option, of the combined commercial and charter halibut quotas for Area 2C, and the resultant commercial allocation would be 87.24%. If these specific allocations are set in regulation, the IPHC or the Council would be legally unable to deviate from these allocations and the sportfish reserve could not be coupled with the GHL. However, the Council could recommend regulations with conditional allocations and a set formula for redirecting a portion of the commercial allocation to the charter sector, for the year(s) subsequent to when the GHL is exceeded.

The reserve concept recognizes that uncaught fish are not available as a unique quantity in future years. Instead, what is available is the yield associated with the uncaught biomass, i.e., some principal is being saved and what is available in future years is the interest on that saved principal. If the stock biomass declines in future years, the available yield will decline in proportion and the yield forgone from previous years, when stock biomass may have been higher, will not be available as a simple add-on to the current year's yield. Specifically, no yield in excess of the present year's estimated total yield will be available for harvest. Changes in what is to be made available to a particular sector in a given year must come through reallocation. The IPHC staff will not recommend extra halibut harvest above the quotas set during its annual meeting. Thus, the reserve must come from the combined sport-commercial quota. The Council can set the allocations as fixed percentages, or floating percentages (conditional allocation), or can set an unallocated portion of the combined quota for reallocation. IPHC staff will not support an open-ended grant of halibut from the resource above the combined quota.

The GHL Committee recommended applying similar language to the halibut fishery as appears in Alaska State regulations to define a salmon reserve. If approved by the Council, such language might read, "If the charter halibut fishery falls short of the minimum needed to maintain the current bag limit and season length under the GHL, the subsequent year's commercial fishery quota will be adjusted lower to allow the charter fishery to continue fishing."

If the sportfish reserve banked the difference between the GHL and the amount of halibut taken in a year, Table 4.6.14 shows the difference between when the GHL measures would go into place with and without a banking of halibut under a sportfish reserve. The fish that accrue towards a sport fish reserve is the difference between the GHL and the amount of halibut taken by the charter fleet in a year. The top section of the table shows the projections when the charter fleet is expected to grow at 6.4 percent per year. The

bottom section shows a growth rate of 3.2 percent per year. The two columns under the "Amount under GHL" heading report the pounds of halibut the charter sector was under the GHL based on 125 percent of the 1998 halibut charter catch. When the numbers become negative, the charter fleet has exceeded the GHL. The two columns on the far right report the amount of halibut that are in the "Reserve". Using the 6.4 percent growth section of the table as an example, without the reserve, GHL measures would go into place in 2001. With the reserve, the GHL would not go into place until 2003. Under the slower growth rate the GHL would go into place in 2004, with no banking of fish. However, if halibut were banked the GHL measures would not begin until sometime after 2005.

In summary, the sportfish reserve appears to be the antithesis of the GHL, in that it would provide for halibut to be reallocated from the commercial sector to the charter sector, once the GHL is reached or exceeded. Implementation of such a banking concept would ultimately nullify any effect of the GHL in constraining halibut charter harvests.

Table 4.14. Projection of when the sport fish reserve would be depleted.

Projected increases using 6.4% overall increase in total sport harvests (in M lb)

	Amount under GHL		Amount in Reserve	
Year	2C	3A	2C	3A
1998	441,750	809,598	441,750	809,598
1999	277,843	497,684	719,593	1,307,282
2000	102,937	164,761	822,530	1,472,043
2001	(83,676)	(190,526)	738,854	1,281,518
2002	(282,751)	(569,619)	456,103	711,899
2003	(495,090)	(974,052)	(38,987)	(262,153)
2004	(721,547)	(1,405,458)	(760,534)	(1,667,611)
2005	(963,032)	(1,865,574)	(1,723,567)	(3,533,184)

Projected increases using 3.2% overall increase in total sport harvests (in M lb)

	Amount under GHL		Amount in Reserve	
Year	2C	3A	2C	3A
1998	441,750	809,598	441,750	809,598
1999	364,502	663,332	806,252	1,472,930
2000	284,575	511,958	1,090,827	1,984,888
2001	201,881	355,310	1,292,708	2,340,198
2002	116,329	193,214	1,409,037	2,533,412
2003	27,827	25,492	1,436,864	2,558,905
2004	(63,723)	(148,040)	1,373,141	2,410,864
2005	(158,420)	(327,574)	1,214,721	2,083,290

Rod permits

A rod limit currently exists in State regulations for Southeast Alaska: 1 rod per person; 6 rods per boat; up to 6 lines/vessel; limited to the number of paying clients such that the maximum number of fishing lines that may be fished from a vessel engaged in sport fishing charter activities is equal to the number of paying

clients on board the vessel. Washington State has an angler permit program, which employs an equation using a vessel's dimensions (length X breadth) to determine the number of rods that could be fished. Based on their formula, a 6-pack vessel limited to 6 persons could have more than 6 rods. The GHL Committee identified perhaps 50 vessels that could upgrade under this type of program. The committee recommended that the Washington program would be a more useful management tool under license limitation. There is not a rod permit program in Oregon as was discussed earlier in Council testimony. This alternative is complicated and has enforcement difficulties.

Possession limits

Option A. Redefine the current halibut possession limit in Areas 2C and 3A equal to two daily bag limits to require that the possession limit is in effect until all affected halibut are processed at the angler's place of permanent residence.

Option B. Redefine halibut possession limits such that they also apply on land adjacent to convention waters off Alaska in Areas 2C and 3A.

In February 1997, the Council initiated an analysis of halibut possession limits in coastal waters off Alaska (NPFMC 1998). The Council's original consideration of the possession limit was a result of three requests: (1) an ALFA proposal to limit charterboat harvest and ultimately harvest beyond the needs of individual anglers and their families and the subsequent sale of sport-caught fish, (2) a Valdez Charterboat Association proposal to increase the sport bag and possession limit, and (3) a motion by the Washington representative to the Council to have Federal possession limit regulations off Alaska (Areas 2C through 4E) to mirror State of Washington regulations for Area 2A. Option A addresses the first issue. The second issue is not included in this analysis since it is counter to the proposed action. Option B addresses the third issue in that a Federal regulation is needed both on land and at-sea for NMFS and the U.S. Coast Guard to enforce possession limits in Alaska.

Option A

In December 1999, the Council requested that staff incorporate the 1997 possession limit analysis into this analysis. Option A is proposed to address the need to limit charter halibut harvests to below the GHL in Areas 2C and 3A. Limited data is available from State or Federal agencies to analyze the effects of the proposed option. However, the analysis of proposed annual angler limits indicate most fishermen harvest between 2 and 4 halibut in a year.

Current Federal and State regulations for bag (2 halibut) and possession limits (2 bag limits) are identical and allow sport (charter and non-charter) anglers to retain halibut within the state or to export any number of processed halibut as long as they were taken legally. The term "processed" means that halibut must be: cooked, canned, smoked, salted (minimum salting of 20% of the weight of the fish), dried, or frozen. "Preserved" means fish prepared in such a manner, and in an existing state of preservation, as to be fit for human consumption after a 15-day period, and does not include unfrozen fish temporarily stored in coolers that contain ice, dry ice, or fish that are lightly salted. Once a halibut bag or possession limit is processed, an angler has zero halibut in possession.

While there is a strong element of recreational enjoyment to sport fishing, many fishermen also 'sport' fish for halibut to feed their families. At the time of this analysis there is no Federal allowance for subsistence fisheries for Pacific halibut, although the Council is scheduled to take final action on an analysis to create a 'subsistence' category. Estimates of sport halibut harvest may include, to an unknown extent, halibut taken on rod and reel for subsistence. Data presented in the EA/RIR for Creating and Defining a Halibut

Subsistence/Personal Use Fishery Category (1997) indicates an average consumption of 17.6 lb of halibut per rural resident. Subarea consumption rates vary (2A - 26 lb; 3A - 14.5 lb; 3B - 22.5 lb; Area 4A-D - 44.5 lb; and Area 4E - 3.3 lb). Assuming consumption rates based on the needs of rural residents and that an angler is feeding a family of four, the current four fish possession limit appears to be adequate (average of 30 lb in Area 2C and 19.3 lb in Area 3A). It is not likely that non-resident anglers who incur the expense of traveling to Alaska to sport fish are reliant on those fish to feed their families. Note that the proposed action would only apply to halibut harvested on charterboats in Area 2C and 3A. Enforcement aspects of the proposed measure will be discussed in greater detail in Section 4.6.3, but in general enforcement will be problematic in determining the number of halibut from potentially canned and filleted/frozen fish.

Under Option A, Area 2C and 3A charter anglers may not possess more than four halibut that are not processed and stored at their place of permanent residence. This requirement would be aimed at preventing charter anglers only in those two areas from exceeding the four fish limit during any one trip away from their place of permanent residence. Changing the possession limit may not by itself: 1) reduce charter harvest to below the GHL once it has been reached, or 2) prevent the illegal sale of sport-caught halibut, although it may reduce the volume of sale. If the Council approves Option A, it may wish to initiate another regulatory amendment for similar changes to regulations governing Area 3B-4E to make possession limits consistent across the state and for all halibut sport anglers.

Option B

Option B was requested to be incorporated into this analysis during the December 1999 meeting as it relates to constraining halibut charter harvest under a GHL. It addresses a lack of clarity in the Federal regulations regarding "where" the possession limit regulation applies.

A brief review of the enforceability issue follows. NOAA General Counsel Alaska Regional Office staff has opined that Federal halibut possession limits *off Alaska* may not have the force of law on land and may be enforceable only at-sea. Current Federal regulations stipulate only that the possession limit on the water is the same as two daily bag limits and do not address possession limits on land. Section 23(7) of the Pacific Halibut Fishery Regulations (64. Fed. Reg. 13519 (March 19, 1999)), provides that "[t]he possession limit for halibut *in the waters off the coast of Alaska* is two daily bag limits." That contrasts with the possession limits for halibut in Area 2A, which expressly limit possession "on land" as well as on the water.

Possession limits implemented through the Area 2A (Washington, Oregon, and California) catch sharing plan (CSP) are implemented for land and sea (FR 13519). These possession limits apply to all halibut possessed, regardless of the condition of the fish (e.g., frozen, fresh). The Pacific Council sets a direct allocation to halibut sport anglers and possession limits are intended in this case to better distribute the allocation among sport anglers and allow for longer seasons because the quota would not be achieved as quickly (Scordino, pers. commun.).

10. *The possession limit for halibut in the waters off the coast of British Columbia is three halibut.*
11. *The possession limit for halibut in the waters off the coast of Washington, Oregon, and California is the same as the daily bag limit.*
12. *The possession limit for halibut on land in Area 2A north of Cape Falcon, OR is two daily bag limits.*
13. *The possession limit for halibut on land in Area 2A south of Cape Falcon, OR is one daily bag limit.*

State of Alaska possession limits apply at-sea and on land. In all waters off California, Oregon, and Washington, all sport fishing is managed on a 'port of landing' basis. Washington Department of Fish and Wildlife possession limit for halibut is two daily limits in any form, except only one limit while aboard a vessel. Oregon Department of Fish and Wildlife regulations limit an angler to one halibut > 32 inches per

day when fishing north of Cape Falcon. The bag limit is one halibut > 32 inches and one halibut > 50 inches for south of Cape Falcon to the California boundary. The Oregon halibut possession limit is equal to one daily bag limit. Off the California coast, the daily bag limit is one halibut > 32 inches.

Option B is not identified as a measure that would necessarily be effective at reducing charter halibut harvests to below the GHL by itself, but in combination with Option A would clarify where and when the possession limit was in effect. Again, both Options A and B apply only to charter anglers in Area 2C and 3A and the Council may wish to initiate a separate regulatory amendment to apply to all sport anglers in all IPHC regulatory areas if it approves those options. If the Council does not approve those options, the issue of enforceability of the current IPHC regulations for possession limits in and off Alaska still remains.

4.6.2.2.3 ISSUE 3: Varying halibut abundance.

Option 1: Status quo. The GHL fixed percentage varies on an annual basis with area halibut abundance. (This is the current GHL approach adopted by the Council in 1997.)

Option 2: Reduce area-specific GHL ranges during years of significant stock decline.

Suboption 1: Reduce to 75-100% of base year amount when the charter allocation is predicted to exceed a specified percentage (options: 15, 20, or 25%) of the combined commercial and charter TAC.

Suboption 2: Reduce area-specific GHL by a set percentage (options: 10, 15 or 20%). The trigger for implementing the reduction would be based on total removals and would be IPHC area-specific:

Area 2C trigger	Area 3A trigger
4 million lb	10 million lb
6 million l00b	15 million lb
8million lb	20 million lb

or an amount proportionate to the reduction in abundance (indicated by the CEY)

The issue of adjusting the GHL range during years of low abundance becomes moot if the Council chooses to set the GHL as a fixed percentage. Therefore, if the Council adopted Issue 1 Option 1, then Issue 3 Option 1 (no action) automatically would be adopted as the Council's preferred option.

Alternatively, if the Council adopted the GHL as a fixed range (Issue 1 Option 2), then the Council must decide whether and how to apply that range in years of low halibut abundance. The Council could have adopted the no action option or either of the two suboptions under Option 2.

Option 2, Suboption 1 proposed to reduce the GHL by 25% ([X - 125%X fish] to [75%X - X fish]) when the GHL exceeded 15%, 20%, or 25% of the combined charter/commercial quota during years of varying abundance. The suboption linked the combined quota in pounds to the range of fish in numbers.

Table 4.6.15 lists three suboption triggers and the combined quota and commercial quota associated with each of those triggers for both base years and areas. For Area 2C, the fixed range of fish associated with the 1995 base year (50 - 62 thousand fish) would be reduced to 38 - 50 thousand fish when the combined charter

Table 4.6.15 Issue 3 Option 2 Suboption 1 triggers for reducing GHL range by base year

AREA 2C						
options	1995 base	commercial	combined	1998 base	commercial	combined
0.15	1.23	5.74	6.97	2.21	10.31	12.52
0.2	1.23	3.69	4.92	2.21	6.63	8.84
0.25	1.23	2.46	3.69	2.21	4.42	6.63

AREA 3A						
options	1995 base	commercial	combined	1998 base	commercial	combined
0.15	0.99	4.62	5.61	1.77	8.25	10.01
0.2	0.99	2.97	3.96	1.77	5.301	7.068
0.25	0.99	1.98	2.97	1.77	3.534	5.301

and commercial quota was 6.97 M lb under the 15% suboption, 4.92 M lb under the 20% suboption, and 3.69 M lb under the 25% suboption.

For the 1998 base year, the fixed range of fish associated with the 1995 base year (54 - 68 thousand fish) would be reduced to 46 - 54 thousand fish (Table 4.6.16a) when the combined charter and commercial quota was 12.52 M lb under the 15% suboption, 8.84M lb under the 20% suboption, and 6.63 M lb under the 25% suboption.

For Area 3A, the fixed range of fish associated with the 1995 base year (138 - 172 thousand fish) would be reduced to 104 - 138 thousand fish (Table 4.6.16b) when the combined charter and commercial quota was 5.61 M lb under the 15% suboption, 3.96 M lb under the 20% suboption, and 9 3.6 M lb under the 25% suboption.

For the 1998 base year, the fixed range of fish associated with the 1995 base year (143 - 179 thousand fish) would be reduced to 107 - 143 thousand fish (Table 4.6.16b) when the combined charter and commercial quota was 10.01 M lb under the 15% suboption, 7.07M lb under the 20% suboption, and 5.30 M lb under the 25% suboption.

Table 4.6.16(a). Suboption 1 GHL reductions for Area 2C and 3A based on 1995 base year.

With a 1995 base year, the fixed range in numbers of fish under consideration in this analysis are:

Current GHL range$_{1995}$ equals 50 - 62 thousand fish in 2C and 138 - 172 thousand fish in 3A

When the trigger is exceeded:

GHL range$_{1995}$ reduced to 38 - 50 thousand fish in 2C and 104 - 138 thousand fish in 3A

Table 4.6.16(b). Suboption 1 GHL reductions for Area 2C and 3A based on 1998 base year.

With a 1998 base year, the fixed range in numbers of fish under consideration in this analysis are:
Current GHL range$_{1998}$ equals 54 - 68 thousand fish in 2C and 143 - 179 thousand fish in 3A

When the trigger is exceeded:
GHL range$_{1998}$ reduced to 46 - 54 thousand fish in 2C and 107 - 143 thousand fish in 3A

Option 2, Suboption 2 proposes to reduce area-specific GHLs by a set percentage (options: 10, 15 or 20%) during years of low halibut abundance. The trigger for implementing the reduction would be based on total removals and would be IPHC area-specific:

Area 2C trigger	Area 3A trigger
4 million lb	10 million lb
6 million lb	15 million lb
8 million lb	20 million lb

or an amount proportionate to the reduction in abundance (indicated by the CEY)

In the mid-1970s the halibut stock was depressed after a number of years of low recruitment and high exploitation rates, including some years of high bycatch. The IPHC reduced commercial quotas to rebuild the stock. The lowest total removals were 4 M lb in Area 2C and 12 M lb in Area 3A. Typical levels of total removals would be 10 M lb in Area 2C and 25-30 M lb in Area 3A. All halibut removals totaled 13.7 M lb in Area 2C and 34.7 M lb in Area 3A in 1998 (Table 3.1).

Therefore, of the proposed area triggers, the lowest levels match the lowest total removals ever recorded and stocks associated with those levels could be considered depressed. The highest proposed triggers are approximately 20% below 'typical' levels of total removals. The intermediate triggers would be somewhere in between. The proposed trigger levels therefore represent reductions of 70%, 56%, and 42%, respectively, from peak (1998) removals for each area.

The intent of the additional trigger level ("or an amount proportionate to the reduction in abundance (indicated by the CEY)") is to link a proportionate reduction of an area-specific GHL range with that of the area-specific CEY determined in the IPHC halibut stock assessment. Staff interprets the time frame to be from one year to the next, that is, compare the 2001 CEY to the 2000 CEY and adjust the range of fish proportionate to that change in CEY, if the change was negative. A positive change in CEYs would not result in a proportionate increase in the range of fish.

Under this suboption, the GHL range of fish would be adjusted by the decline in CEY. Historical CEYs are presented in Table 1; however, the 1999 CEY reflects the IPHC's current understanding of stock abundance and recruitment. The Area 2C total CEY was reduced by 34% between 1999 and 2000. The Area 3A total CEY was reduced by 40%.

To illustrate its effectiveness, a proportionate reduction to the range of fish by area would be:

For Area 2C, the fixed range of fish associated with the 1995 base year (50 - 62 thousand fish) would be reduced to 33 - 41 thousand fish. This compares to 38 - 50 thousand fish when the combined charter and

commercial quota was 6.97 M lb under the 15% suboption, 4.92 M lb under the 20% suboption, and 3.69 M lb under the 25% suboption.

For the 1998 base year, the fixed range of fish associated with the Area 2C 1995 base year (54 - 68 thousand fish) would be reduced 40 - 50 thousand fish. This compares to 46 - 54 thousand fish when the combined charter and commercial quota was 12.52 M lb under the 15% suboption, 8.84M lb under the 20% suboption, and 6.63 M lb under the 25% suboption.

For Area 3A, the fixed range of fish associated with the 1995 base year (138 - 172 thousand fish) would be reduced to 83 - 103 thousand fish. This compares to 104 - 138 thousand fish when the combined charter and commercial quota was 5.61 M lb under the 15% suboption, 3.96 M lb under the 20% suboption, and 9 3.6 M lb under the 25% suboption.

For the Area 3A 1998 base year, the fixed range of fish associated with the 1995 base year (143 - 179 thousand fish) would be reduced to 93 - 116 thousand fish. This compares to 116 - 138 thousand fish when the combined charter and commercial quota was 10.01 M lb under the 15% suboption, 7.07 M lb under the 20% suboption, and 5.30 M lb under the 25% suboption.

Applying triggers in combination

The intent of Issue 3, Option 2, Suboption 1 is to reduce the GHL range set at 100% and 125% of a base year determined by the Council to a new GHL range set at 75% and 100% of the base year. This range reduction would occur when the charter allocation (harvest) is predicted to exceed a specified percentage (either 15, 20, or 25%) of the combined commercial and charter TAC.

This suboption is not tied to overall halibut abundance. It is "triggered" when the charter harvest exceeds some percentage of the overall combined commercial and charter TAC. This could potentially occur at any level of overall abundance based on harvest characteristics of the two user groups in a given year.

The intent of Issue 3, Option 2, Suboption 2 is to reduce the GHL range by either 10, 15, or 20% when total removals in an area decline to certain levels (4, 6, and 8 million pounds in 2C; 10, 15, and 20 million pounds in 3A). The Council could choose to reduce the GHL range (using 2C as an example) by 10% when total removals declined to 8 million pounds, by 15% when total removals reached 6 million pounds, and by 20% when total removals dropped to 4 million pounds. The Council could also choose other percentages by which to reduce the GHL range at the three levels of total removals.

This suboption is directly tied to overall halibut abundance. If total removals remained above 8 million pounds in 2C and above 20 million pounds in 3A, this suboption would not be "triggered" and there would be no regulatory action to reduce the GHL range.

The Council could choose to adopt both suboptions with the intent that they operate independently of each other. If this is the case, four potential scenarios exist.

1. The charter harvest remains below the "trigger" percentage established in Suboption 1 and total removals remain above the "trigger" levels in Suboption 2: No reductions to the GHL range mandated by either suboption.

2. The charter harvest rises above the "trigger" percentage established in Suboption 1 but total removals remain above the "trigger" levels in Suboption 2: The GHL range would be reduced to 75 and 100% of the base year.

3. The charter harvest remains below the "trigger" percentage established in Suboption 1 but total removals drop below the "trigger" levels in Suboption 2: The GHL range would be reduced by either 10, 15, or 20%.

4. The charter harvest rises above the "trigger" percentage established in Suboption 1 and total removals drop below the "trigger" levels in Suboption 2: The GHL range would be reduced to 75 and 100% of the base year and it would be further reduced by either 10, 15, or 20%.

Suboptions 1 and 2 reduce the GHL range at very different levels of abundance. Suboption 1 could be applied at levels of charter harvest at or near current levels, depending on whether 1995 or 1998 is adopted as the base year (Table 4.6.16a and b), as described above. This occurs because the trigger level for reducing the GHL range is set near the percentage from which the GHL range is converted. In contrast, Suboption 2 would not trigger reductions in the range until total harvests had been reduced by 42-70%, depending on the Council's preferred alternative. Three choices are included in the analysis for levels to reduce the range, depending on the base year (Table 4.6.17a and b).

Table 4.6.17(a). Suboption 2 GHL reductions for Area 2C and 3A based on 1995 base year.

With a 1995 base year, the fixed range in numbers of fish under consideration in this analysis are:
Current GHL $range_{1995}$ equal to 50 - 62 thousand fish in 2C and 138 - 172 thousand fish in 3A

When the trigger is exceeded:
GHL $range_{1995}$ reduced by 10% to: 45 - 56 thousand fish in 2C and 124 - 156 thousand fish in 3A
GHL $range_{1995}$ reduced by 15% to: 43 - 53 thousand fish in 2C and 117 - 147 thousand fish in 3A
GHL $range_{1995}$ reduced by 20% to: 40 - 50 thousand fish in 2C and 110 - 138 thousand fish in 3A

Table 4.6.17(b). Suboption 2 GHL reductions for Area 2C and 3A based on 1995 base year.

With a 1998 base year, the fixed range in numbers of fish under consideration in this analysis are:
Current GHL $range_{1998}$ equal to 54 - 68 thousand fish in 2C and 143 - 179 thousand fish in 3A

When the trigger is exceeded:
GHL $range_{1998}$ reduced by 10% to: 49 - 61 thousand fish in 2C and 129 - 161 thousand fish in 3A
GHL $range_{1998}$ reduced by 15% to: 46 - 58 thousand fish in 2C and 122 - 152 thousand fish in 3A
GHL $range_{1998}$ reduced by 20% to: 43 - 54 thousand fish in 2C and 114 - 143 thousand fish in 3A

4.6.2.2.4 ISSUE 4: GHL or allocation

Option 1: Under a GHL and the current IPHC setline quota formula, halibut not harvested by the charter fleet in one year are rolled into the commercial setline quota the following year.

Option 2: Unharvested halibut would remain unharvested under a direct allocation to the charter sector.
Suboption: unharvested halibut banked in a sportfish reserve

Option 1 is tied to the Council's interpretation that the GHL is a target against which the level of charter harvests are gauged to determine if management measures need to be invoked to further constrain those levels. The current IPHC procedure for calculating the commercial setline quotas is described in Section

4.6.2.1. No change to quota setting would occur. Halibut charter harvests would be deducted along with all other non-commercial removals from the CEY; the remainder could be set as the commercial setline quota. Under Option 1, the difference in halibut that could be harvested by charter anglers under the GHL and what is annually harvested, would in effect "roll over" to the commercial sector at the start of the season.

Option 2 is distinct from Option 1 in that as an allocation, the commercial sector would not accrue the full benefit of any unharvested GHL halibut in the subsequent year. While the overall CEY will likely be higher because fewer removals occurred, the commercial sector would be constrained by its allocation percentage that will be adopted by the Council. As an example, the Council could set the GHL in Area 2C as a fixed percentage equal to 12.35% based on 1995 charter removals. Under Option 2, the Council could "allocate" 12.35% of the combined charter/commercial quota to the charter sector. That percentage is the amount up to which charter anglers could harvest halibut, without triggering constraining management measures. However, with the assumption that the Council does not in fact intend to close the charter fishery in-season, charter anglers could exceed its GHL for one, and possibly two seasons, before constraining measures implemented in a subsequent season result in a reduced charter harvest.

The remaining 87.24% would be allocated to the commercial sector and would be the legal limit for commercial landings in that area. Option 2 would further constrain the commercial fishery by the additional reduction of its quota from those unharvested fish that are not assigned to that sector. Under the 2C example for this option, the commercial sector would have foregone an additional 256,000 lb in 1995, had the GHL been in place.

The next issue under Option 2 considered by the Council is whether the unharvested halibut should accrue conceptually in a sportfish reserve. Charter sector proponents of "banking" unharvested fish in such a system have defined the reserve such that unharvested fish would not accrue "pound for pound" in the reserve, but that the sector would get a credit for those unharvested fish when the GHL is constraining their clients. This system is discussed in more detail in Section 4.6.2.2.2, but in summary, a sportfish reserve negates the effects of a GHL by "reallocating" additional halibut to the charter sector when that sector's harvests would exceed the GHL and trigger constraining management measures. This reallocation would be redirected from the commercial quota, an outcome which would be inconsistent with the Council's stated objectives of this action.

4.6.2.2.5 Implementation Strategies

It is essential that the Council adopt a strategy that is implementable and cost effective, allows for the use of the best available information, and provides for adaptability. Three significant questions exist with regard to implementation of any halibut charterboat GHL option considered by the NPFMC. These are:

1. What information will be used to assess harvest?
2. How will specific management measures be selected and implemented?
3. How should the management objective for harvest be stated?

Harvest Estimation: At the present time, several data collection programs are fielded by the Alaska Department of Fish and Game to assess charter fishery performance including:

1. Statewide Mail Survey. This mail survey is used to estimate sport fishing and harvest on a statewide basis. Within these estimates are estimates of the charter and non-charter recreational harvest and release of halibut.

2. Statewide Guide Registration. This statewide registration program is used to track the number of sport fishing guides and guide business that are operating in Alaska's fresh and marine waters annually. Within this database are the number of businesses and guides that target halibut.

3. Statewide Marine Logbook. This logbook provides estimates of recreational effort and harvest on marine charters operating off the coast of Alaska. Included are estimates of halibut harvests and participation by charters in the halibut fishery. As noted earlier in this analysis, the State discontinued its logbook program in 2001. NMFS is currently in the process of developing an alternative data collection program. This program has not yet been developed, but is likely to incorporate a logbook reporting system.

4. Port Sampling. This program provides estimates of the average size and age of recreationally-caught halibut in the major ports of landing in Areas 2C and 3A.

5. Creel Surveys. The Division uses creel surveys in select areas to estimate recreational effort and harvest. One such survey is used to estimate king salmon harvest in Southeast Alaska. This survey also provides partial estimates of halibut harvest. Similar surveys are used selectively in Southcentral Alaska and provide partial estimates of halibut harvest.

Each of these programs has strengths and limitations. Creel surveys provide valuable firsthand observations of the fishery but they are very expensive and lack full geographical coverage. Port sampling provides biological information and important fishery statistics including areas of landings and fishing effort, but is expensive and does little to help assess total area harvest. The Statewide Mail Survey, a post-season survey, is a long time series data set that provides excellent geographical coverage and is reasonably accurate and cost effective, but the estimates of harvest are not available for up to one year after the fishing season in question. In total, the Alaska Department of Fish and Game currently spends about $300,000 to $350,000 annually in these programs to collect information on the halibut sport fishery. The development of a separate data collection program by NMFS will aid in the ability to monitor the guided recreational fleet in a timely manner.

Because no specific management program has been in effect for the halibut charter fishery, it should be recognized that none of these assessment programs have demonstrated utility under the allocation/management options under consideration. Until such time as each tool's utility is proven, it will be necessary for harvest estimates to be based on an aggregation of the best available information.

Table 4.6.18. Estimated percentage of total harvest reduction by month obtained by implementing a 1-fish bag limit in Areas 2C and 3A during 1998 and 1999.

Area	Month	1998	1999
2C	May	2	1
	June	12	10
	July	14	14
	August	10	14
	September	1	1
	Total	39	40
3A	May	5	4
	June	14	13
	July	17	16
	August	7	10
	September	1	2
	Total	44	45

Management measure selection: The Council has identified 11 management measures that could be used to adjust harvest in an effort to maintain the charter fishery within the allocation provided under a GHL or other harvest allocation plan. These are: line limits, boat limits, annual angler limits, vessel trip limits, bag limits, super-exclusive registration, sport catcher vessel only areas, sport fish reserves, rod permits, possession limits, and restrictions on retention of halibut by skipper and crew.

One measure would temporally adjust bag limits pre-season. This option was not considered in the public review draft EA/RIR/IFRA distributed on January 10, 2000. It was generally discussed by the Council during their

deliberations of this issue and is being recommended by the State as another management option for Council consideration. Based on the ADFG logbook program, it is estimated that enactment of a one- fish bag limit during specific periods of the open season could potentially reduce harvest 1% to 45% in Areas 2C and 3A (Table 4.6.18). Smaller reductions would be realized by limiting the bag limit to one during May and June with larger reductions being realized by limiting the bag limit to one during the peak months (June, July, or August) of the fishery (Figures 4.6.5 and 4.6.6). A total season restriction of the bag limit to 1 would reduce harvest by about 40% in Area 2C and 45% in Area 3A.

Determining the best management measure, or combination of measures, to use should be based on the best, most current information available. For this reason, it is preferable to make a list of tools available to managers from which a manager may select one or more of the tools listed. This is the approach used to manage the recreational chinook salmon fishery in Southeast Alaska. However, as noted above, final rule making may preclude such flexibility. As such, the measures may need to be periodically evaluated by the Council.

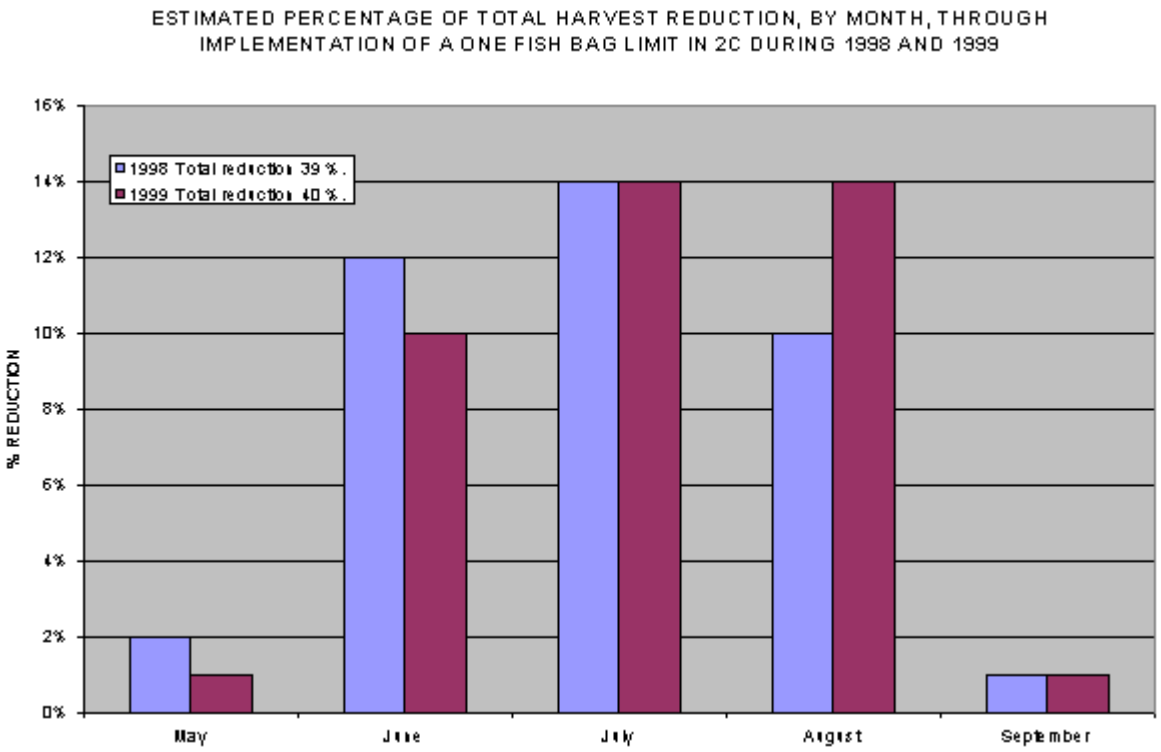


Figure 4.6.5. Estimated percentage of total harvest reduction, by month, obtained by implementing a 1 fish bag limit in Area 2C, 1998 and 1999.

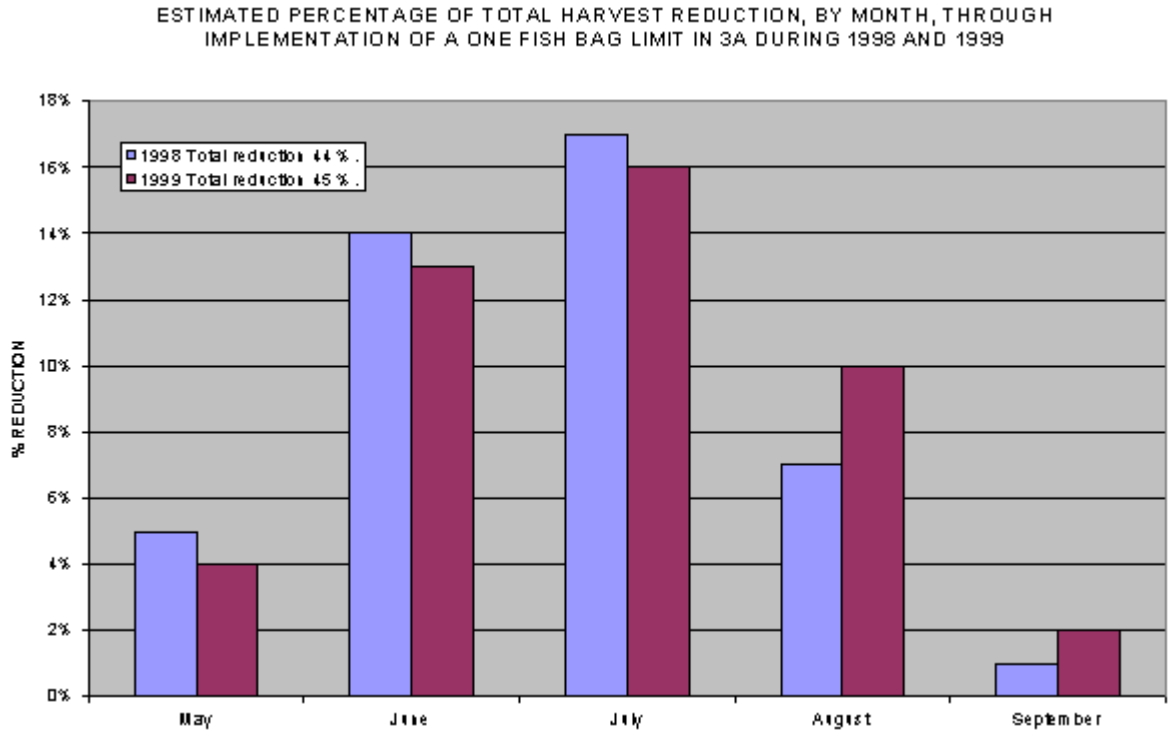


Figure 4.6.6. Estimated percentage of total harvest reduction, by month, obtained by implementing a 1 fish bag limit in Area 3A, 1998 and 1999.

Table 4.6.19. Estimated harvest reduction by implementing annual limits on anglers fishing from charter vessels

ANNUAL LIMIT	HARVEST REDUCTION (PERCENT)	
	2C	3A*
4	39	25
6	18	15
7	8	10
10	2	6

* The original calculations were done for non-residents only. The assumption was made that residents fishing from charter vessels in 3A had the same harvest patterns as non-residents. Therefore, the harvest reductions in 3A were increased by 1/3 to account for reductions in resident harvest also. Since less than 5% of charter clients in 2C are residents, no changes were made to the original harvest reduction estimates.

Framework management matrices depicting how the above management measures could be employed to manage a GHL or other allocation scheme for Areas 2C and 3A are depicted in Tables 4.6.19-21, respectively. These matrices are "sample" implementation strategies that show how various measures could be employed to reduce harvest in both areas. They are presented as placeholder frameworks to facilitate discussion, and are not intended as "the" proposed implementation strategy. Different matrices are provided for Areas 2C and 3A to account for differences in fishery performance in the two areas and to remind the public of the Council's ability to select different management measures in each area.

The potential harvest reductions presented in the matrix were calculated based on performance statistics of the halibut charter fishery during 1998 and 1999. Various factors, such as changes in halibut stock abundance, local area plan management, and changes in fleet behavior or clientele to imposed regulations, could affect the realized harvest reduction potential. For example, if halibut stock size was to decrease as speculated by the IPHC, effects of an annual limit or reduced daily bag limit are likely to be less than noted. Also, the management measures in each harvest reduction category may not be independent and therefore may not be additive.

Structure and Stability of the Management Objective for Harvest: A management objective for harvest should be stated in such a manner as to take into account the management precision of the assessment program. Stating the objective in the form of a range can provide for this acknowledgment. In addition, the more stable the management objective for harvest, the more likely the objective will be achieved. An annually shifting allocation has a high probability of requiring annual adjustments that are small enough to be beyond the precision of the management tools and ability to evaluate.

Currently, ADF&G provides the IPHC with a preliminary estimate of that year's sport harvest in December based on logbook, creel survey, and port sampling information. The IPHC uses this estimate to project the harvest in the sport fishery for the next year. At the end of the next year, ADF&G provides a final estimate of the previous year's sport fishery based on the results of the statewide mail survey.

NMFS identified that perhaps as little as six weeks may be needed (dependent upon staff availability) between public notice of charter harvests exceeding the GHL (e.g., December) and public notice to implement triggered management measures for a non-discretionary decision by the NMFS Regional Administrator (mid-February). Such a process would utilize a closed framework action based on an analysis of the proposed action (this EA/RIR/IRFA).

Alternatively, an open framework action whereby the RA exercises his discretion in selecting to implement a triggered management measure(s) may be as long as 4 months (e.g., April). In this case, the additional time is needed to notice the public for comment and provide final notice (the 30 day comment period may be waived to reduce the required time to 3 months, e.g., March). A trailing regulatory amendment may be required in the open framework process if sufficient time has rendered the analyses obsolete to the time of his decision or staff must develop the rationale for his decision in choosing from numerous measures.

The Council has expressed a desire to minimize disruption to the charter industry. In this case, a one year notice may be desirable, and triggering a management measure the following season may meet industry needs. This has the benefit of basing management measures on final estimates of charter harvest.

Table 4.6.20 Management measure matrix for reducing harvest in Area 2C.

HARVEST REDUCTION REQUIRED	MANAGEMENT TOOL	ESTIMATED HARVEST REDUCTION POTENTIAL
< 10%	PROHIBIT HARVEST BY SKIPPER AND CREW	3%
10 – 20%	PROHIBIT HARVEST BY SKIPPER AND CREW	3%
	ANNUAL LIMIT OF 6 FISH	18%
	TOTAL	21%
20 – 30%	PROHIBIT HARVEST BY SKIPPER AND CREW	3%
	ANNUAL LIMIT OF 6 FISH	18%
	REDUCE BAG LIMIT TO ONE FISH/DAY IN AUGUST	12%
	TOTAL	33%
30 – 40%	PROHIBIT HARVEST BY SKIPPER AND CREW	3%
	ANNUAL LIMIT OF 4 FISH	39%
	TOTAL	42%
> 40%	PROHIBIT HARVEST BY SKIPPER AND CREW	3%
	ONE FISH/DAY BAG LIMIT FOR ENTIRE SEASON	40%
	TOTAL	43%

Implementation of management tools to achieve harvest reductions from 0 – 20% could take place the season following the overage. Implementation of management tools to achieve harvest reductions above 20% could take place one year following the overage to give charter industry more time to adjust.

Table 4.6.21. Management measure matrix for reducing harvest in Area 3A.

HARVEST REDUCTION REQUIRED	MANAGEMENT TOOL	ESTIMATED HARVEST REDUCTION POTENTIAL
< 10%	PROHIBIT HARVEST BY SKIPPER AND CREW	8%
10 – 20%	PROHIBIT HARVEST BY SKIPPER AND CREW	8%
	ANNUAL LIMIT OF 7 FISH	10%
	TOTAL	18%
20 – 30%	PROHIBIT HARVEST BY SKIPPER AND CREW	8%
	ANNUAL LIMIT OF 4 FISH	25%
	TOTAL	33%
30 – 40%	PROHIBIT HARVEST BY SKIPPER AND CREW	8%
	ANNUAL LIMIT OF 4 FISH	25%
	REDUCE BAG LIMIT TO ONE FISH/DAY IN AUGUST	8%
	TOTAL	41%
> 40%	PROHIBIT HARVEST BY SKIPPER AND CREW	8%
	ONE FISH/DAY BAG LIMIT FOR ENTIRE SEASON	45%
	TOTAL	53%

Implementation of management tools to achieve harvest reductions from 0 – 20% could take place the season following the overage. Implementation of management tools to achieve harvest reductions above 20% could take place one year following the overage to give charter industry more time to adjust.

4.6.2.3 Council Preferred Alternative: Approve management measures to implement halibut charter guideline harvest levels in Areas 2C and 3A. (*Council Preferred Alternative*)

During final action in February 2000, the Council adopted the following preferred options:

ISSUE 1: The Area 2C and 3A GHLs are based on 125% of the average of 1995-99 ADF&G SWHS charter harvest estimates to be managed in pounds. This equates to:
13.05% of the combined charter and commercial quota in Area 2C; or 1,432,000 lb net weight
14.11% of the combined charter and commercial quota in Area 3A; or 3,650,000 lb net weight

In setting the GHL, the Council reviewed halibut harvests between 1995 and 1999 and specifically reviewed three possible time periods to set the GHL: (1) 1995-99; (2) 1998-99; and (3) 1997-99. To avoid issues related to a reported change in weight of charter halibut between 1998 and 1999, the Council approved a GHL based on 125% of the average halibut harvest for 1995-99, the longest time period under review. The Council also approved the GHL in pounds. This mirrors the units in which the IPHC collects and analyzes landings data for the stock assessment and sets the commercial quota.

ISSUE 2: Implement management measures using the following implementation regime for each IPHC regulatory area. These measures would be removed if harvests fall below the GHL and they are no longer necessary. If the GHL is exceeded, 0-20% reduction measures (e.g., trip limits, prohibiting harvest by skipper and crew) would be implemented in the season following the overage. In years of >20% overage, measures that are projected to achieve 0-20% reduction in charter harvest would be implemented in the following season and measures that are projected to achieve >20% reduction in charter harvest (e.g., annual limits, one-fish bag limit in August) would be implemented one year later to allow for verification of charter harvest. The regulations will establish a framework process to review and adjust the management measures in the event of an overage and to evaluate their efficacy to determine if a subsequent regulatory package is necessary.

Agency staff met twice in January 2000 to address enforcement and implementation issues related to the halibut charter GHL. The staff report is summarized under Section 4.6.2.4. The Council reviewed this information during final action and approved an implementation schedule (listed below) once the GHL is reached in each area.

ISSUE 3: Under varying halibut abundance:

Regulations will reduce the area GHLs in proportion to reductions in area abundance (as best determined by the IPHC) based on the average of 1999-2000 in a stair-step fashion. The first step reduction is 15% (e.g., from 1.40 to 1.19 M lb in Area 2C), additional 10% step reductions will occur as needed (from 1.19 to 1.07 M lb). This approach is responsive to changes in abundance. The stair-step smooths out the problem of annual variation posed by a strict percentage-based system. When the abundance returns to the pre-reduction level, then the GHL would step back up (e.g., from 1.19 to 1.40 M lb in Area 2C).

Area 2C Management Tools	
Required Reduction	Management Tool
<10%	Trip Limit
10% - 15%	Trip Limit
	No Harvest by Skipper + Crew
15% - 20%	Trip Limit
	No Harvest by Skipper + Crew
	Annual Limit of 7 Fish
20% - 30%	Trip Limit
	No Harvest by Skipper + Crew
	Annual Limit of 6 Fish
30% - 40%	Trip Limit
	No Harvest by Skipper + Crew
	Annual Limit of 5 Fish
40% - 50%	Trip Limit
	No Harvest by Skipper + Crew
	Annual Limit of 4 Fish
>50%	Trip Limit
	No Harvest by Skipper + Crew
	Annual Limit of 4 Fish
	One Fish Bag Limit in August

Area 3A Management Tools	
Required Reduction	Management Tool
<10%	Trip Limit
10% - 20%	Trip Limit
	No Harvest by Skipper + Crew
20% - 30%	Trip Limit
	No Harvest by Skipper + Crew
	Annual Limit of 7 Fish
30% - 40%	Trip Limit
	No Harvest by Skipper + Crew
	Annual Limit of 6 Fish
40% - 50%	Trip Limit
	No Harvest by Skipper + Crew
	Annual Limit of 5 Fish
>50%	Trip Limit
	No Harvest by Skipper + Crew
	Annual Limit of 4 Fish
	One Fish Bag Limit in August

4.6.2.4 NMFS Preferred Alternative: Implement a Guideline Harvest Level for the guided sport halibut fishery that sets a ceiling level of 1,432,000 lb net weight in Area 2C and 3,650,000 lb net weight in Area 3A (and a formula for reductions in times of lower halibut abundance) which triggers notification to the Council when a GHL is reached.

Under the NMFS preferred alternative, NMFS would issue a final rule to publish a GHL for managing the harvest of Pacific halibut in the charter fishery in Areas 2C and 3A. The GHL would establish an amount of halibut that may be harvested annually in these fisheries. NMFS would notify the Council within thirty days of receiving information that the GHL has been exceeded. The timing of this notification would depend on the data collection system that is in place at the time the GHL is exceeded. If the SWHS is the only data collection available, then it is likely that such a notification would not take place until the August after the GHL has been exceeded. Typically, ADF&G publishes the final results from the previous year's survey in August, some eight months after the end of the year. If a NMFS data collection program were put into place, it may be possible to collect and analyze harvest data in a more timely fashion. This would reduce the amount of time required to notice the Council if the GHL were exceeded. Once it receives the notification, the Council could choose to initiate an analysis of possible harvest reduction measures. NMFS could then initiate subsequent rulemaking to reduce charter harvests through implementation of harvest reduction measures, which might include, but are not limited to, those management measures examined in this analysis. As with the no action alternative, the NMFS preferred action will not result in the promulgation of any regulations affecting the halibut charter fishery. Therefore, there are no associated costs and benefits of this proposed action, other than the minimal costs born by NMFS when implementing this regulation and publishing the annual harvests.

The GHL would establish a pre-season estimate of acceptable annual harvests for the halibut fishery in Areas 2C and 3A.The GHL for each area is based on 125 percent of the average of 1995-99 charter harvest

estimates as reported by the ADF&G Statewide Harvest Survey (SWHS). This level of harvest would accommodate limited growth of the charter fleet while approximating historical harvest levels. By weight, the GHLs equate to 13.05 percent of the combined charter and commercial quota in Area 2C or 1,432,000 lb net weight and 14.11 percent in Area 3A or 3,650,000 lb net weight. The GHL halibut poundage amounts in each area are considered to be a base level that may be stepped-down with decreases in stock abundance.

The GHLs are established as a total maximum poundage subject to annual reductions in stock abundance. If the IPHC determines that the halibut stocks in either area are below the average 1999-2000 stock abundance, the area GHL would be reduced in a stepwise fashion in proportion to the stock reduction. The GHL would be stepped back up by commensurate increments to its initial level if abundance returns to equal or exceed its pre-reduction level. The GHL would never exceed its initial level if halibut stock abundance in either area increased above its 1999-2000 average. The Council chose not to provide a mechanism to increase the GHL above this initial level if there were increases in the stock abundance. Further, the Council stated its intent that the GHLs would not close the fishery, but instead would trigger other management measures in years following attainment of the GHL. The overall intent was to maintain a stable charter fishery season of historic length, using area-specific management measures to control harvests.

The NMFS preferred alternative does not implement the framework harvest restrictions recommended in the Council's preferred alternative. Instead, the final rule regulatory text would include, if approved by the Secretary: (1) the GHL in Areas 2C and 3A; (2) the mechanism for reducing the GHL in years of low abundance as determined by the IPHC; (3) a requirement for NMFS to publish the GHL on an annual basis in the *Federal Register*; and (4) a requirement for NMFS to notify the Council in writing within 30 days of receiving information that the GHL has been exceeded in either area. At that time, the Council may chose to initiate an analysis of alternative management restrictions on the charter fishery and propose harvest reduction restrictions through the usual Administrative Procedure Act (APA) rulemaking process. The suite of harvest restrictions recommended by the Council and published in the proposed rule may be one of the alternatives that are analyzed in subsequent rulemaking if the GHL is exceeded. The Council may choose other reasonable alternative harvest reduction restrictions if the GHL is exceeded.

The difference between the Council preferred alternative and the NMFS preferred alternative is that the latter would imposes no restrictions on the charter fishery as outlined in the proposed rule. This is necessary to address concerns raised by NOAA-General Counsel, Alaska Region concerning the ability to implement the harvest restriction measures without providing opportunity for public comment under APA rulemaking procedures. The effect is to establish the GHL as a notification to the Council for consideration of possible subsequent rulemaking, but not to establish specific harvest restriction measures. A short history of Council action on its attempts to manage this fishery is provided below.

The Council selected its original preferred alternative for managing this fishery in September 1997. It recommended that the Secretary establish GHLs in Areas 2C and 3A, based on 125% of the charter sector's 1995 harvest. These GHLs equated to 12.35% of the combined commercial and charter halibut quota in Area 2C, and 15.57% in Area 3A, based on available data in 1997. Revised harvest estimates indicated that the GHLs equated to 12.34% and 15.54%, respectively.

In a letter dated November 24, 1997, the NMFS Alaska Regional Administrator (RA) informed the Council that the GHL would not be published as a regulation. Further, no formal decision by the Secretary was required to implement the GHL since the Council had not recommended specific management measures to be implemented by NMFS if the GHL were reached. He reported that the Council's intent regarding its GHL policy may be satisfied, however, by publishing it as a notice in the *Federal Register*. Such notice was not filed.

Instead, the Council initiated a public process to identify GHL management measures to implement the GHL, as advised by NMFS. The Council selected its more recent preferred alternative in February 2000 (described above), and NMFS published a proposed rule on January 28, 2002 (67 FR 3867). Subsequent to those actions, the RA identified that Federal rules implementing the proposed GHL and associated harvest reduction measures may be vulnerable to legal challenge as structured by the Council. The Council preferred alternative envisioned that the appropriate harvest reduction measures would be triggered to be in effect for the following season once NMFS had data indicating that the level of halibut harvests from a previous season exceeded the GHL. These measures to reduce charter harvests would be implemented by notification. This notification process would supercede the regular APA rulemaking process. It would minimize potential delays between exceeding the GHL and implementing measures to reduce the guided fishery harvests by establishing a "framework" of measures that are automatically implemented.

As described in a letter to the Council from the RA dated September 6, 2002, General Counsel staff advised that implementing the harvest reduction measures likely would require the APA rulemaking process. The Council's preferred alternative would expose NMFS to an unacceptable risk of a successful legal challenge. The APA requires that any regulatory action provide prior notice and opportunity for public comment before becoming effective. This requirement can be waived only for "good cause." The harvest reduction measures in the proposed rule likely could not be implemented under the "good cause" exemption of the APA. The APA provides for a "good cause" finding only when the agency finds that notice and opportunity for public comment would be impracticable, unnecessary, or contrary to the public interest (5 U.S.C. 553(b)(B)). These terms are narrowly defined. Because this "good cause" finding would need to be made at the time the harvest reduction measures are implemented, we cannot guarantee now that a "good cause" finding would exist in every instance the GHL was exceeded and harvest reduction measures triggered. Accordingly, a strong likelihood exists that proposed and final rulemaking would be required when implementing any of the proposed harvest reduction measures.

Case law from courts reflects a discontent for agency actions that do not permit public participation. The agency determination to framework harvest reduction measures constitutes an action with legal consequences under the APA that should receive public notice and comment. Complying with this APA requirement would substantially change the proposed halibut guided fishery management program from what was originally conceived by the Council.

A second issue which may affect the implementation of the Council's preferred alternative is the inability of existing data collection methods to adequately monitor several of the reduction measures envisioned in the proposed rule. The Council envisioned the possible use of data collection methods already employed by the State, including the Statewide Harvest Survey (SWHS), and the Saltwater Charter Vessel Logbook (Logbook). Notwithstanding the State's recent decision to discontinue data collection for halibut in its logbook. NMFS would require additional information on times and dates of the end of fishing trips, as well as information identifying each individual angler and his or her total harvests aboard charter vessels to adequately monitor halibut harvests in this fishery. First, the time required to collect and compile data from the SWHS would result in at least a two-year delay when implementing or relieving frameworked harvest reductions on the guided fishery. Second, the SWHS does not collect information necessary to monitor annual harvest limits on individual sports fishermen, which is one of the harvest reduction measures recommended by the Council. As noted earlier, NMFS is in the process of developing a data collection program. It is envisioned that such a program would address the data collection needs that are not met by the existing SWHS.

A result of the NMFS preferred alternative is a more deliberative, public process and detailed harvest data collection for determining appropriate management restrictions to reduce halibut harvests once a GHL is reached. Using realistic expectations of the time required for each of these steps listed in the box at right, a lag of perhaps up to five years may occur from when an overage occurs and to harvest restrictions are implemented at the start of a new fishing season.

4.6.3 Administration, Monitoring, and Enforcement

For purposes of the Paperwork Reduction Act (PRA), NMFS needs authorization from the Office of Management and Budget to collect the necessary information from charter vessel operators and fishermen. While it is difficult to assess actual costs, the budgetary requirements for NMFS to develop its own data collection system for recording charterboat halibut harvests could be substantial, requiring personnel to receive catch reports and to calculate overall harvest. At a minimum, one full-time employee at GS 7 level, at $12.00 an hour, would be needed to receive reports and enter them into a data collection system for eleven months of the year, the duration of the halibut sportfishing season. If electronic reporting methods were devised, a data management system would need to be developed and maintained. For example, creating the software for the electronic component of information collection for the recent IFQ cost recovery program is expected to cost approximately $25,000. To date, NMFS has spent $90,000 on a contract to design a data collection program. The development of that program may reach approximately $200,000 prior to its implementation. These costs would be the same under either the Council or NMFS preferred alternatives.

The GHL program, as recommended by the Council in its preferred alternative, would likely require a huge additional burden on enforcement personnel and their associated costs. If the volume of catch indicates that the GHL has been reached or exceeded, one or more management measures would be employed in subsequent years to ensure that charter harvests of halibut remain below the GHL. Annual management measures implemented to restrict removals by charter vessels would require enforcement operations to assure compliance with such measures.

Currently, halibut removals by the charter fleet are monitored by the State of Alaska only, with the annual SWHS and, since 1998, a charter vessel logbook requirement. NMFS would need to gain formal access to the State's sport harvest and length data to calculate removals against the GHL and to acquire additional enforcement personnel for assuring compliance with management measures. For NMFS to make use of data collected by the State, Federal and State regulations require that NMFS and ADF&G first determine that such use would satisfy Federal and State regulations on confidentiality of data and other applicable Federal and State laws. NOAA, ADF&G, and CFEC recently signed a Reciprocal Data Access Agreement for sharing commercial fisheries data collected by NMFS, ADF&G, and CFEC; the lengthy process by which the agencies reached this agreement would presumably facilitate and expedite a similar agreement for sportfishing information for managing the charterboat halibut fishery, but negotiations for such an agreement might nevertheless take up to five or six months.

Effect of APA rulemaking with NMFS data collection system

Year 1	GHL is reached
Year 2	Data collection programs document the overage NMFS notifies the Council Council initiates analysis to implement harvest reduction measures
Year 3	Council selection of preferred alternative
Year 4	Final rulemaking
Year 4/5	Restrictions implemented at start of new fishing season.

The 1997 Council analysis reviewed two management tools that are associated with an allocation in commercial fisheries. Any program which implements a specific quota on a sector of the industry must include some method of effecting a fishery closure

when that quota is reached. Two basic methods were identified: (1) in-season monitoring of harvest and the announcement of a closure upon attainment of the quota, or (2) setting the season length at the start of the fishing year based on projections of effort and catch. The Council has rejected these tools, in favor of a third method: adjustments in bag limits or line limits designed to keep the overall harvest below the GHL, but without effecting an actual closure, thus, reducing the potential adverse economic effects on the charterboat sector, while achieving the objectives of the action. Under the NMFS preferred alternative, the costs associated with implementing management measures to reduce charter halibut harvests as proposed under The Council Preferred Alternative, would be deferred until implementation new rulemaking as a result of a future Council action based on NMFS notification that a GHL had been reached.

Enforcement

Enforcement is a key component of any fishery harvest management program. The NMFS, USCG, ADPS, and ADF&G all report that they do not have enforcement programs specifically directed at the recreational charter fishery. Instead, enforcement occurs on an opportunistic basis. All agencies agree that some level of additional enforcement would be needed under a GHL system, depending upon the allocation and implementation scheme adopted. Also, the decision to allocate additional enforcement to this program would properly entail an evaluation of the public interest in doing so, versus doing less enforcement somewhere else.

Staff discussed GHL enforcement issues, especially the implications of activating the various measures like line, bag, and trip limits. Although a state enforcement officer was not present, the other agencies essentially reported that additional enforcement resources would not be forthcoming to support this program.

Having said that, there are characteristics of the recreational charter fishery that suggest a different and lesser level of enforcement may be needed to ensure an adequate level of compliance with the program. Several characteristics of the fishery differentiate it from other fisheries and work to the advantage of regulators:

a. The recreational charterboat fishery operates in the public eye. Requiring operators to prominently post GHL control measures like bag limits and line limits onboard charterboats would help promote compliance. The State could further support this by requiring those businesses selling sportfishing licenses to do the same.

b. The recreational charterboat fishery is highly competitive. While there are some operations in isolated locations, many boats tie up and operate in close proximity to other charterboats. It is reasonable to expect that those operators who are following the rules would be quick to notice another operator seeking to "steal" customers by offering a better trip with higher bag or rod limits.

c. Charterboat operators are required to have a current Coast Guard license to operate. One of the conditions of the license requires the operator to comply with *all* Federal regulations. Charterboat operators potentially risk losing their Coast Guard license if they violate Federal fisheries regulations. It is reasonable to conclude that because of the nature of the Coast Guard license, inferring a trust and responsibility to the licensee, as well as the double jeopardy implications, charterboat operators would likely have a higher rate of compliance with GHL measures than might otherwise be expected.

These three factors, along with the current system of opportunistic enforcement, may provide a level of compliance sufficient to ensure the GHL measures have the desired effect in controlling the fishery.

The Coast Guard has taken the position that where the above does not hold true, the Coast Guard could respond by shifting effort from other areas to focus on the charter fleet if there is sufficient public interest

and concern in the conduct of the recreational charter fishery. A highly publicized focus operation, of short duration, may have sufficient impact to raise compliance back up to an acceptable level, while only requiring a modest shift of enforcement effort. These operations could be done periodically through the region and season, under an overall strategy of raising compliance to an acceptable level. This approach is different from one that attempts to identify the law enforcement resources necessary to check all fishery participants or apprehend all violators.

No enforcement costs are associated with the NMFS preferred alternative of publishing notice in the *Federal Register* and sending a letter tot he Council.

4.6.4 Summary and Conclusions

Alternative 1, no action, would result in continued unconstrained charter halibut harvests and a *de facto* reallocation of halibut from the commercial sector to the charter sector. This analysis assumes that sport halibut removals will increase by approximately 9% in Area 2C and 4% in Area 3A for the charter sector and 1% in the unguided sector over the next 5 years. If that rate of growth does occur in future years, the ex-vessel gross revenues to the commercial fishery in Areas 2C and 3A would decline by about 4 % per year. Given the current TAC and ex-vessel prices of $2.10/lb (IPHC, pers. commun.), this amounts to a decrease of $7.1 M in Area 2C and $13.4 M in Area 3A in nominal dollars over the entire 2000-2005 time horizon.

Under Alternative 2, the guideline harvest level, by itself, has no management effect on either charter or commercial harvests. The associated management measures are the critical components of the program.

The following general picture of the halibut charter and commercial fisheries was drawn:

- halibut biomasses are at peak abundances, but likely to decline in the short-term;
- quotas were reduced in 2000, but are likely to remain steady in the short-term;
- charter harvests are continuing to increase, but at declining rates;
- commercial quotas decline as charter harvests (along with all other halibut removals) increase.

Five specific management issues have been identified which conform with the Council's April 1999 suite of alternatives, options, and suboptions. This section draws the following conclusions regarding these issues.

ISSUE 1: Apply GHLs to Areas 2C and/or 3A to trigger management measures as a fixed percentage annually expressed in pounds or a fixed range in numbers of fish, based on 125% of 1995 or 1998 charter harvests.

In 1997, the Council adopted the GHL based on a fixed percentage based on 1995 charter harvests. This equated to 12.35% of the combined charter harvest and commercial quota in Area 2C and 15.57% in Area 3A (as calculated in 1997). Under this action, the Council considered whether to alter that decision by adopting the GHL as a fixed range of numbers of fish and revising the base year to 1998. This would have revised the GHL percentages to a fixed point somewhere between 12.35-16.39% in Area 2C and 12.87-15.57% in Area 3A and set the GHL range between 50 - 68 thousand fish in Area 2C and 143 - 179 thousand fish in Area 3A. To address concerns regarding possible declines in halibut abundance, a set of reduction mechanisms are tied to the fixed range, which are addressed under Issue 3.

In determining whether the base year should be updated, the analysis examined higher and lower growth projections to estimate when the respective GHLs might be reached. From this:

- ADF&G harvest data appear to have exceeded the 1995-based GHL in 1998. Therefore, had the 1997 GHL decision been approved by the Secretary, GHL management measures would be triggered for the next fishing season in Area 2C.
- The projected timeline suggests that under higher growth rates, the charter harvest in Area 2C could reach the 1998-based GHL sometime during 2000 - 2001 and under lower growth rates, sometime during 2003 - 2004.
- Area 3A projections indicate that the 1995-based GHL might be reached sometime during 1999 - 2000 under the higher projection and 2000 - 2001 under the lower projection.
- The 1998-based GHL might be reached during 2000 - 2001 under the higher projection and during 2003 - 2004 under the lower projection.

ISSUE 2: Implement management measures, with an option to close the fishery in-season once the GHL is reached.

bag limits	annual angler limit	sport catcher vessel only area
boat limit	vessel trip limit	sportfish reserve
line limits	super-exclusive registration	rod permit

Of the eleven measures to constrain charter harvests in future years to within the respective GHLs analyzed here, only bag limits and prohibiting crew-caught halibut appear to limit charter harvests.

- The reduction in harvest effected by a bag limit will likely exceed the actual decrease in halibut that can be kept assuming that effort does not change. This is because effort can be expected to change as anglers react to the change in quality of the average halibut trip. Preliminary model runs estimate the change in participation resulting from a one-fish bag limit to be quite substantial in Area 3A, resulting in harvest levels that are much lower than necessary to keep the charter sector below the GHL level. Allocative effects will depend on how these uncaught fish are distributed among the commercial and sport sectors.
- Boat limits would result in the same amount of halibut being harvested on a trip as the bag limit alternatives, and, in fact, may result in higher harvests under the proposed "collective" or party fishing definition.
- Line limits may redirect fishing effort between vessels, but is unlikely to further restrict harvest. A 6-line limit and restrictions of lines to number of paying passengers currently exists in Area 2C; additional restrictions would limit vessels to a 4-packs or 5-packs. Nearly 90% of Area 2C charters took four clients in 1998, therefore, a 4-line limit may not result in adequate reductions to stay within the GHL. Area 3A charter vessels traditionally fish up to 27 lines. A floating scale for line limits may address traditional fishing patterns on larger sized vessels. A prohibition of fish harvested by crew may result in adequate harvest reduction to keep the harvest within the respective GHLs. Enforcement of lines "fished" would also be difficult.
- Most charter clients take either two or four halibut in a year. A small percentage of avid anglers exceed that, indicating that annual angler limits will have less impact on total halibut removals compared with impacts on the amount of halibut taken by a few fishermen.
- Only 4% of Areas 2C and 3A trips would be affected by limiting a vessel to one trip each day. If an average trip results in an average harvest, then a vessel trip limit may result in a harvest reduction of 4%. Recognizing the overcapacity of the fleet, clients will likely charter on another available vessel.
- Super-exclusive registration and Sport Catcher Vessel Only Areas may redistribute fishing effort but are unlikely to reduce halibut removals. They may be valid management tools to be included within a LAMP.
- A rod limit currently exists in State regulations for Southeast Alaska: 1 rod per person; 6 rods per boat; up to 6 lines/vessel; limited to the number of paying clients such that the maximum number of fishing lines that may be fished from a vessel engaged in sport fishing charter activities is equal to the number of paying clients on board the vessel.

- An in-season closure is included as an option in the analysis. The Council and State of Alaska has indicated its interest in using management measures that would be triggered for a subsequent fishing season rather than closing the fishery in-season due to data, management, and other concerns.
- The sportfish reserve would nullify the constraining effect of the GHL by reallocating halibut from the commercial sector to the charter sector when the GHL would trigger a reduction.
- Possession limits will not be an effective management tool since most fishermen harvest only one or two halibut per year; however, proposed changes would enhance Federal enforcement of current possession limits.
- Prohibiting halibut harvested by the captain and crew may limit the charter harvest to below the GHL; however, enforcement may be difficult on multi-species charters since it would be in effect for halibut only.

Relative effectiveness of proposed management measures

Proposed measures	no	+	++	+++
line limits				
boat limit				
annual angler limit				
vessel trip limit				
bag limits				
super-exclusive registration				
sport catcher vessel only area				
sportfish reserve				
rod permit				
possession limits				
prohibit crew-caught fish				

ISSUE 3: Adjust the GHL fixed range of fish under varying halibut abundance.

Adjusting the GHL range during years of low abundance becomes moot if the Council chooses to set the GHL as a fixed percentage. Alternatively, if the Council adopts the GHL as a fixed range (Issue 1 Option 2), then the Council must decide whether and how to apply that range in years of low halibut abundance.

Suboptions 1 and 2 reduce the GHL range at very different levels of abundance. Suboption 1 proposes to reduce a GHL range by 25% when it exceeds 15%, 20%, or 25% of the combined charter/commercial quota during years of varying abundance. The suboption links the combined quota in pounds to the range of fish in numbers. The combined quota triggers equate to approximately 3.7, 4.9, and 7.0 M lb in Area 2C and 6.6, 8.8, and 12.5 M lb in Area 3A.

Suboption 2 would not trigger reductions in the range until total harvests had been reduced by 42-70%, depending on the Council's preferred alternative. Three choices are included in the analysis for levels to reduce the range, depending on the base year. Proposed total removal trigger levels are 4, 6, and 8 M lb for Area 2C and 10, 15, and 20 M lb for Area 3A. The lowest levels match the lowest total removals ever recorded and stocks associated with those levels could be considered depressed. The highest proposed triggers are approximately 20% below 'typical' levels of total removals. The intermediate triggers would be somewhere in between.

ISSUE 4: Determine whether a GHL or allocation

Option 1 is tied to the Council's interpretation that the GHL is a target against which the level of charter harvests are gauged to determine if management measures need to be invoked to further constrain those levels. Under Option 1, the difference in halibut that could be harvested by charter anglers under the GHL and what is annually harvested, would in effect "roll over" to the commercial sector at the start of the season.

Option 2 is distinct from Option 1 in that as an allocation, the commercial sector would not accrue the full benefit of any unharvested GHL halibut in the subsequent year. While the overall CEY will likely be higher because fewer removals occurred, the commercial sector would be constrained by the allocation percentage adopted by the Council.

The next issue under Option 2 is whether the unharvested halibut should accrue conceptually in a sportfish reserve. Charter sector proponents of "banking" unharvested fish in such a system have defined the reserve such that unharvested fish would not accrue "pound for pound" in the reserve, but that the sector would get a credit for those unharvested fish when the GHL is constraining on their clients.

In summary, a sportfish reserve negates the effects of a GHL by "reallocating" additional halibut to the charter sector when that sector's harvests would exceed the GHL and trigger constraining management measures. This reallocation would be redirected from the commercial quota, thus failing to achieve the purpose and intent of the proposed action.

ISSUE 5: Establish a moratorium, either area-wide or local

Area-wide and local moratorium options were analyzed separately in Section 5. Those conclusions that relate to the GHL are repeated here.

- The alternatives would qualify between 497 and 694 vessels, if 1998 logbook participation is required. These numbers are substantially less than the numbers actually participating in 1998 and 1999, based on the logbook information. Option 4 only requires participation in any year 1995-1998 and would qualify 2,073 vessels. Allowing supplementary information for qualification (other than IPHC license and/or 1998 logbook) could increase the number of qualifying participants.
- Although the total harvest capacity of the fleet is difficult to estimate, the currently licensed fleet (based on 1998 logbooks) has a harvest capacity well above the current harvest level, and even the currently active fleet is probably not operating at its maximum capacity. The presence of excess harvest capacity reduces the effectiveness of a moratorium and the ability to predict when it may become constraining on harvest. Only when latent capacity is filled would a moratorium become effective at maintaining harvest within the GHL.
- The more restrictive moratorium options being considered may result in an effective moratorium; i.e., along with other management measures, may be effective at keeping the charter fleet within a GHL. This is particularly true if the GHL is set at a level higher than the current harvest level, and/or if it is set at a fixed poundage. A GHL based on a floating percentage, combined with declines in overall halibut biomass, reduce the likelihood of the moratorium's effectiveness; i.e., at low GHL levels, there likely will be excess capacity relative to that GHL under all options.

During final action in February 2000, the Council adopted the following under its preferred alternative.

ISSUE 1: The Area 2C and 3A GHLs are based on 125% of the average of 1995-99 ADF&G SWHS charter harvest estimates to be managed in pounds. This equates to:

13.05% of the combined charter and commercial quota in Area 2C; or 1,432,000 lb net weight

14.11% of the combined charter and commercial quota in Area 3A; or 3,650,000 lb net weight

In setting the GHL, the Council reviewed halibut harvests between 1995 and 1999 and specifically reviewed three possible time periods to set the GHL: (1) 1995-99; (2) 1998-99; and (3) 1997-99. To avoid issues related to a reported change in weight of charter halibut between 1998 and 1999, the Council approved a GHL based on the average halibut harvest for 1995-99, the longest time period under review. The Council also approved the GHL in pounds. This mirrors the units in which the IPHC collects and analyzes landings data for the stock assessment and sets the commercial quota.

ISSUE 2: Implement management measures using the following implementation regime for each IPHC regulatory area. These measures would be removed if harvests fall below the GHL and they are no longer necessary. If the GHL is exceeded, 0-20% reduction measures (e.g., trip limits, prohibiting harvest by skipper and crew) would be implemented in the season following the overage. In years of >20% overage, measures that are projected to achieve 0-20% reduction in charter harvest would be implemented in the following season and measures that are projected to achieve >20% reduction in charter harvest (e.g., annual limits, one fish bag limit in August) would be implemented one year later to allow for verification of charter harvest. The regulations will establish a framework process to review and adjust the management measures in the event of an overage and to evaluate their efficacy to determine if a subsequent regulatory package is necessary.

Agency staff met twice in January 2000 to address enforcement and implementation issues related to the halibut charter GHL. The staff report is summarized under Section 4.6.2.4. The Council reviewed this information during final action and approved an implementation schedule (listed below) once the GHL is reached in each area.

ISSUE 3: Under varying halibut abundance:

Regulations will reduce the area GHLs in proportion to reductions in area abundance (as best determined by the IPHC) based on the average of 1999-2000 in a stair-step fashion. The first step reduction is 15% (e.g., from 1.40 to 1.19 M lb in Area 2C), additional 10% step reductions will occur as needed (from 1.19 to 1.07 M lb). This approach is responsive to changes in abundance. The stair-step smooths out the problem of annual variation posed by a strict percentage- based system. When the abundance returns to the pre-reduction level, then the GHL would step back up (e.g., from 1.19 to 1.40 M lb in Area 2C).

Area 2C Management Tools

Required Reduction	Management Tool
<10%	Trip Limit
10% - 15%	Trip Limit
	No Harvest by Skipper + Crew
15% - 20%	Trip Limit
	No Harvest by Skipper + Crew
	Annual Limit of 7 Fish
20% - 30%	Trip Limit
	No Harvest by Skipper + Crew
	Annual Limit of 6 Fish
30% - 40%	Trip Limit
	No Harvest by Skipper + Crew
	Annual Limit of 5 Fish
40% - 50%	Trip Limit
	No Harvest by Skipper + Crew
	Annual Limit of 4 Fish
>50%	Trip Limit
	No Harvest by Skipper + Crew
	Annual Limit of 4 Fish
	One Fish Bag Limit in August

Area 3A Management Tools

Required Reduction	Management Tool
<10%	Trip Limit
10% - 20%	Trip Limit
	No Harvest by Skipper + Crew
20% - 30%	Trip Limit
	No Harvest by Skipper + Crew

	Annual Limit of 7 Fish
30% - 40%	Trip Limit
	No Harvest by Skipper + Crew
	Annual Limit of 6 Fish
40% - 50%	Trip Limit
	No Harvest by Skipper + Crew

	Annual Limit of 5 Fish
>50%	Trip Limit
	No Harvest by Skipper + Crew
	Annual Limit of 4 Fish
	One Fish Bag Limit in August

The GHL, by itself, as proposed under the NMFS preferred alternative, has no management effect on halibut harvests.

Administration

To enhance efficiency and ensure that necessary measures are invoked in a timely manner, non-discretionary measures may be enacted such that their implementation occurs automatically upon the charter fleet's attaining or exceeding the GHL by publication of a Federal Register notice. The regulatory amendment, Requiring an additional and specific RIR analysis of impacts, would also establish the duration of such management measures and the circumstances upon which such measures would be lifted. To minimize delay of imposition of triggered GHL management measures, the Council could either: 1) select only one management measure that would be triggered if a GHL is attained or exceeded; or 2) select multiple measures that would all be implemented simultaneously.

Limitations Associated With 1998 Logbooks

Three of the four alternatives being considered for an area-wide moratorium require 1998 participation via the logbook program. Because this was the first year of that logbook program, there are concerns with using that as the basis for any limited entry program such as a moratorium or license limitation program. In terms of using the data from the logbook program for other management options (such as projections related to harvest and whether and when a GHL would be triggered) there are also limitations which should be noted. The primary limitations are summarized as follows:

-Because it was the first year of the program, many charter operators were unaware of the logbook requirement. It is clear that several charter operators heard about the logbook requirement at year's end and then filled out and submitted them.

-Preliminary analysis of the 1998 logbook data compared to on-site surveys in Area 3A show that almost 18% of on-site, vessel-trip interviews had no corresponding logbook entry on that date. Some of those could be because the operator recorded the trip on the wrong day, or recorded the wrong CFEC number, etc., but at least some portion did not report a trip all season.

-Quite a few vessels did not report the port of landing or stat area fished. This would not in and of itself prevent use of the data for a moratorium, but may compromise the track records of individual operators.

-Data on crew harvest is very incomplete and very few were submitted. Either it was recorded as client harvest, or not recorded at all when it occurred. This would weaken any analysis of catch per angler or the effects of certain rod limit alternatives (not allowing crew to retain fish).

-Some data on multiple trips is compromised; for example, a charter operator in Valdez reported that several operators were not breaking out their trips, choosing instead to report multiple trips in one day as one trip so that they would not have to fill out the supplemental forms.

-In many cases extremely large (nonsensical) values were obtained for number of rods per vessel which might detract from any line limit analyses based on this information.

-Consideration of super-exclusive registration, or sport only areas should recognize that there are quite a few missing stat areas and ports of landing.

-As mentioned in section 5.2.1, participation was based on whether a vessel was bottomfishing. The logbook data cannot be used to definitively determine target species. Some of the trips could be for lingcod, sharks, or rockfish. The analysis assumes any bottomfishing included targeting halibut.

In 2002, the NMFS RA notified the Council that the implementing management measures would not be approved by the Secretary. Instead, a new preferred alternative was identified that would promulgate a final rule that would include: (1) the GHL in Areas 2C and 3A; (2) the mechanism for reducing the GHL in years of low abundance as determined by the Commission; (3) a requirement for NMFS to publish the GHL on an annual basis in the Federal Register; and (4) a requirement for NMFS to notify the Council in writing within 30 days of receiving information that the GHL has been exceeded.

5.0 CONSISTENCY WITH OTHER APPLICABLE LAWS

5.1 Halibut Act Requirements

The North Pacific Halibut Act of 1982 governs the promulgation of regulations for managing the halibut fisheries, in both State and Federal waters. The language in the Halibut Act regarding the authorities of the Secretary of Commerce and the Regional Fishery Management Councils is excerpted below:

'The Regional Fishery Management Council having authority for the geographic area concerned may develop regulations governing the U.S. portion of Convention waters, including limited access regulations, applicable to nationals or vessels of the U.S., or both, which are in addition to, and not in conflict with regulations adopted by the Commission. Such regulations shall only be implemented with the approval of the Secretary, shall not discriminate between residents of different States, and shall be consistent with the limited entry criteria set forth in Section 303(b)(6) of the Magnuson Act. If it becomes necessary to allocate or assign halibut fishing privileges among various U.S. fishermen, such allocation shall be fair and equitable to all such fishermen, based upon the rights and obligations in existing Federal law, reasonably calculated to promote conservation, and carried out in such a manner that no particular individual, corporation, or other entity acquires an excessive share of the halibut fishing privileges...'

From the language in the Halibut Act, it is clear that while the jurisdictional authority for limited access and other allocation measures resides within the provisions of the Halibut Act, consideration of those types of measures is subject to many of the same criteria described under the Magnuson-Stevens Act. In particular, the 303(b)(6) provisions of the Magnuson-Stevens Act and the language from National Standard 4 are directly referenced. Therefore, the following sections are included to discuss the consistency of the proposed alternatives relative to certain provisions of the Magnuson-Stevens Act and other applicable laws, without regard for whether such treatment is formally required.

5.2 National Standards

Below are the 10 National Standards as contained in the Magnuson-Stevens Act (Act), and a brief discussion of the consistency of the proposed alternatives with those National Standards, where applicable.

<u>National Standard 1 - Conservation and management measures shall prevent overfishing while achieving, on a continuing basis, the optimum yield from each fishery</u>

None of the alternatives would inhibit the prevention of overfishing. A cap on the charter fishery, *if implemented as a strict allocation between the two sectors,* could result in foregone harvests of the halibut resource, relative to the status quo, if the charter fleet does not harvest the full amount of its allocation. This is because ,under the status quo, the commercial fleet would have been allocated an amount of halibut resulting in full harvest of the overall quota. However, the amount of this potentially unharvested fish, under any alternative, would likely be minimal, representing less than 5% of the overall quota. This is similar to the amount which currently goes unharvested under the commercial IFQ fishery, and the 'loss' of this fish to harvest may be more than offset by other management concerns, including considerations under National Standard 8.

Options which establish the GHL as a target cap but not as a strict allocation (rather, other management measures are triggered to keep the charter fleet below the target catch share) do not result in unharvested fish by the commercial sector, other than the amount which goes unharvested by choice. It is not clear whether the existing distribution of halibut catch among the sectors is at an optimal level, or whether the alternatives under consideration would result in the optimal yield from the fishery.

National Standard 2 - Conservation and management measures shall be based upon the best scientific information available.

While information on the charterboat industry is less definitive than for most commercial fisheries management considerations, considerable effort and expense has been applied to analysis of the alternatives in this document. The results of the contract work by ISER in 1997 (which are referenced in relevant sections of this analysis) comprise the most definitive information available on the composition and characteristics of the charter halibut fishery. Because harvest levels by the charter fleet are a function of client demand, rather than biomass or quota levels, definitive estimates of future harvest, in the absence of a GHL, are not possible with the information available.

National Standard 3- To the extent practicable, an individual stock of fish shall be managed as a unit throughout its range, and interrelated stocks of fish shall be managed as a unit or in close coordination.

The Pacific halibut stock is considered by the IPHC to be a single stock in the North Pacific, though with significant migratory patterns and shifts in distribution, both within years and across years. However, it is managed by more discrete regulatory areas (Areas 3A and 2C for example) as is described in the analysis.

National Standard 4 - Conservation and management measures shall not discriminate between residents of different states. If it becomes necessary to allocate or assign fishing privileges among various U.S. fishermen, such allocation shall be (A) fair and equitable to all such fishermen, (B) reasonably calculated to promote conservation, and (C) carried out in such a manner that no particular individual, corporation, or other entity acquires an excessive share of such privileges.

The only aspect of the proposed alternatives which could differentially affect residents by state would be a cap on the charterboat fleet which curtails their season. This would be an indirect effect in that, if charters are unavailable in the latter part of the season, visitors from out of state would be disproportionately affected - while resident anglers would also be precluded from a charter trip, they would have a much higher likelihood of making other arrangements for halibut fishing, or taking their trip earlier in the season. None of the alternatives would allocate disproportionate fishing privileges - a moratorium alone would define who could participate, but would not affect the degree to which any charter operator could fish.

National Standard 5 - Conservation and management measures shall, where practicable, consider efficiency in the utilization of fishery resources, except that no such measure shall have economic allocation as its sole purpose.

While economic allocation, between commercial and charter fisheries, is a potential consequence of the alternatives, various other considerations are identified in the Problem Statement and are considered in the analyses (see National Standard 8, for example).

National Standard 6 - Conservation and management measures shall take into account and allow for variations among, and contingencies in, fisheries, fishery resources, and catches.

The proposed alternatives are structured to, among other objectives, accomplish what is implied by National Standard 6. Under the existing management structure, any reductions in the overall halibut quota available are at the expense of the commercial fleet, because projected catch by the charter fleet is taken off the top prior to setting the commercial quotas. A system of percentage allocations (via a GHL) between the charter fleet and the commercial fleet would provide a more fair and equitable basis for distributing the quota when there are natural fluctuations in the biomass. A moratorium has the potential to create a similar stability between sectors, as well as enhance stability within the charter fleet when these fluctuations occur.

National Standard 7 - Conservation and management measures shall, where practicable, minimize costs and avoid unnecessary duplication.

Imposing either additional reporting requirements, a moratorium, a cap on the catch by the charter fishery, or any combination of those would increase costs of management relative to the status quo. Reporting requirements would impose minimal costs to the fleet, but would create additional costs to the agency for compiling and processing the information from those reports. A moratorium would likely impose the greatest costs to management agencies, with additional staff being required to administer the applications and appeals process. Subsequent enforcement of the moratorium could impose additional costs to the agency. The proposed cap on the catch by the charter fleet (GHL) would impose significant costs, but only if the cap was effected through in-season monitoring of catch, as opposed to simply setting the season length at the beginning of the year, or managing it as a trigger which would effect other management measures in subsequent years.

National Standard 8 - Conservation and management measures shall, consistent with the conservation requirements of this Act (including the prevention of overfishing and rebuilding of overfished stocks), take into account the importance of fishery resources to fishing communities in order to (A) provide for the sustained participation of such communities, and (B) to the extent practicable, minimize adverse economic impacts on such communities.

The alternatives within this analysis are specifically proposed to, among other things, deal with issues relating to community stability. For example, one of the primary problems identified with the status quo is the open-ended reallocation from commercial to charter fishing, and the attendant potential impacts to coastal communities which rely on the commercial halibut fishery. This is complicated by the fact that the charter fleet, in most cases, is based in those same communities, and stability for the community as a whole is based on trade-offs between those two sectors within the community. An explicit division of the quotas, as well as a moratorium on further entry into the charter fishery, has the potential to enhance overall community stability by defining the expectations of all users of the halibut resource. Overall economic activity within communities may be more of a trade-off between sectors within the community, though one sector may contribute more economic activity per fish than the other.

National Standard 9 -Conservation and management measures shall, to the extent practicable, (A) minimize bycatch, and (B) to the extent bycatch cannot be avoided, minimize the mortality of such bycatch.

Not applicable to this issue.

National Standard 10 - Conservation and management measures shall, to the extent practicable, promote the safety of human life at sea.

Not applicable to this issue.

5.3 Section 303(a)(9) - Fisheries Impact Statement

The Magnuson-Stevens Act requires that any management measure submitted by the Council take into account potential impacts on the participants in the fisheries, as well as participants in adjacent fisheries. Without regard to whether this is formally required, under the proposed action, the following information is provided. The impacts of a GHL on the charter fleet catch have been discussed in previous sections of this document. A strict allocation (cap) for the charter sector, depending on what percentage is adopted and on future halibut quotas, could adversely impact operators within the charter fleet by curtailing their operating season, and reducing the number of trips, and income, they are able to generate. A 'soft' GHL

(imposed as a target which would trigger other measures in subsequent years) would not curtail the charter fishing season, but could influence client demand for fishing trips. Not imposing a cap has the potential to create negative impacts to the participants in the commercial halibut fishery, as a greater percentage of the overall halibut quotas goes to the charter fishery over time.

A moratorium on further entry could positively impact participants in the charter fishery by reducing potential competition and providing a more stable operating environment, with or without a GHL. Depending on the qualification criteria chosen by the Council, however, some participants, or potential participants, might be excluded from the fishery with obvious negative impacts to their operations. The choice of participation criteria will be a very critical issue in the Council's consideration of the moratorium.

Less obvious impacts could accrue to participants in 'adjacent' fisheries from either the cap or the moratorium alternative. As more and more fisheries, both in Alaska and nationwide, become subject to limited entry management measures, existing and potential fishermen have fewer and fewer options upon which to apply their existing or planned investments. Potential entrants into the charter fishery, from in-state and out-of-state, will have to turn to other, perhaps overcrowded, fisheries, or pursue other lifestyles. Perhaps the most immediate and significant impact of either the moratorium or the cap alternative would be to concentrate effort in other charter fisheries in Alaska, such as salmon. The cap alternative may not create as significant an impact, since salmon fisheries occur earlier in the summer anyway, and the cap would only impact halibut fishing and in-season measures. A moratorium on further entry into the halibut charter fishery would leave potential new guides, lodges, and outfitters nowhere to participate other than the salmon, rockfish, and lingcod fisheries.

Not imposing a GHL with the associated framework of harvest restrictions could reduce the amount of halibut available to the commercial fisheries, particularly if the charter fishery continues to expand and the halibut quota decreases. This could increase effort by commercial halibut fishermen in other commercial fisheries in which they are permitted to participate.

5.4 Section 303(b)(6) - Limited Entry Requirements

Under Section 303 (b)(6) of the Magnuson-Stevens Act, the Council and SOC are required to take into account the following factors when developing a limited access system: (A) present participation in the fisheries, (B) historical fishing practices in, and dependence on, the fisheries, (C) the economics of the fisheries, (D) the capability of fishing vessels used in the fisheries to engage in other fisheries, (E) the cultural and social framework of the fisheries, and (F) any other relevant considerations.

In considering a proposed limited entry program for the charter fleet, the Council contracted with ISER in 1997 to provide the heretofore lacking information on the structure, dynamics, and economics of that industry sector. That information has been updated in this analysis with information from the current logbook program which defines active participation in these fisheries. Sections 3.0 and 4.0 of this document contain further descriptions of the economics of the charter fishery. Section 4. 5 describes the limited entry (moratorium) alternatives being considered, details the current participation levels as evidenced by the logbook program, and describes the historical participation in terms of IPHC licenses held from 1995-1998. The charter fisheries are characterized by considerable entry and exit, even across the four years being considered for participation eligibility. Limitations associated with using the 1998 logbooks as evidence of participation are detailed in Section 4.5, as well.

5.5 Regulatory Flexibility Act

5.5.1 Introduction

The Council is considering limiting the halibut charter industry's harvest in IPHC Areas 2C and 3A. Restricting increases in catch may be accomplished using one or a combination of measures. Under a GHL, NMFS would implement management measures to slow charter harvests of halibut in the year after a set percentage of the TAC or a specific number of halibut are harvested by the charter fleet. In addition to measures that would slow the harvest of halibut, the Council is also considering a moratorium on new entry into the halibut charter fishery. The moratorium would limit future expansion of the number of vessels in the fishery (and possibly limit harvests within GHL target levels), while protecting the current participants should a limit be imposed on their harvests by providing a more stable operating environment. NMFS is also considering management measures which would establish a notification process if a GHL in a given area, but would not contain a framework of harvest restriction measures.

The Regulatory Flexibility Act (RFA) requires analysis of impacts to small entities, one component if which is composed of small businesses, which may result from regulations being proposed. In order to allow the agency to make a certification decision, or to satisfy the requirements of an Initial Regulatory Flexibility Analysis (IRFA) of the preferred alternative, this IRFA has been included, which is specified to contain the following:

- A description of the reasons why action by the agency is being considered;
- A succinct statement of the objectives of, and the legal basis for, the proposed rule;
- A description of, and where feasible, an estimate of the number of small entities to which the proposed rule will apply (including a profile of the industry divided into industry segments, if appropriate);
- A description of the projected reporting, recordkeeping and other compliance requirements of the proposed rule, including an estimate of the classes of small entities that will be subject to the requirement and the type of professional skills necessary for preparation of the report or record;
- An identification, to the extent practicable, of all relevant Federal rules that may duplicate, overlap or conflict with the proposed rule;
- A description of any significant alternatives to the proposed rule that accomplish the stated objectives of the Magnuson-Stevens Act and any other applicable statutes and that would minimize any significant economic impact of the proposed rule on small entities. Consistent with the stated objectives of applicable statutes, the analysis shall discuss significant alternatives, such as:

    1. The establishment of differing compliance or reporting requirements or timetables that take into account the resources available to small entities;
    2. The clarification, consolidation, or simplification of compliance and reporting requirements under the rule for such small entities;
    3. The use of performance rather than design standards;
    4. An exemption from coverage of the rule, or any part thereof, for such small entities.

5.5.2 Statement of the Problem

The recent expansion of the halibut charter industry, including outfitters and lodges, may make achievement of Magnuson-Stevens Act National Standards more difficult. Of concern is the Council's ability to maintain the stability, economic viability, and diversity of the halibut industry, the quality of the recreational experience, the access of subsistence users, and the socioeconomic well-being of the coastal communities dependent on the halibut resource. Specifically, the Council notes the following areas of concern with respect to the recent growth of halibut charter operations, lodges and outfitters:

1. Pressure by charter operations, lodges and outfitters may be contributing to localized depletion in several areas.
2. The recent growth of charter operations, lodges and outfitters may be contributing to overcrowding of productive grounds and declining harvests for historic sport and subsistence fishermen in some areas.
3. As there is currently no limit on the annual harvest of halibut by charter operations, lodges, and outfitters, an open-ended reallocation from the commercial fishery to the charter industry is occurring. This reallocation may increase if the projected growth of the charter industry occurs. The economic and social impact on the commercial fleet of this open-ended reallocation may be substantial and could be magnified by the IFQ program.
4. In some areas, community stability may be affected as traditional sport, subsistence, and commercial fishermen are displaced by charter operators, lodges, and outfitters. The uncertainty associated with the present situation and the conflicts that are occurring between the various user groups may also be affecting community stability.
5. Information is lacking on the socioeconomic composition of the current charter industry. Information is needed that tracks: (1) the effort and harvest of individual charter operations, lodges, and outfitters; and (2) changes in business patterns.
6. The need for reliable harvest data will increase as the magnitude of harvest expands in the charter sector.

5.5.3 Objective Statement of Proposed Action and its Legal Basis

The objective of the proposed action is to provide a process of notification which will provide the Council an opportunity to consider any additional management measures on the halibut charter industry in possible future rulemaking actions in IPHC Areas 2C and 3A. During the early 1990s this fleet experienced substantial growth. Projections made in the mid-1990s indicated that, if left unchecked, the charter fleet could grow to a level equal to or greater than the commercial fleet in Areas 2C and 3A by year 2008. Growth in the charter fleet harvests is difficult to ascertain, with wide fluctuations in harvest levels over the past four years (1995-1998). However, decreases in halibut biomass levels, combined with any growth in catch by the charter fleet, would result in a defacto reallocation away from the commercial fleet, under the status quo. The Halibut Act along with the Magnuson-Stevens Act grants the Council authority to oversee allocations of the halibut fishery in Alaskan and Federal waters. Setting overall removals of halibut is under the authority of the International Pacific Halibut Commission.

5.5.4 Description of each action (non-mutually exclusive alternatives)

The complete list of specific alternatives is contained in Chapter 1 of this document. Though there are a number of options and suboptions, the major alternatives being considered are:

1. Status Quo - do not develop measures to implement a guideline harvest level (GHL) for the halibut charter fishery.

2. Establish a GHL as
   (a) a percentage of the combined commercial/charter quota,
   (b) a range (in numbers of fish or poundage)

3. Implement a range of management measures as necessary to maintain the charter harvest within the GHL - options include the following:

   - line limits
   - boat limit
   - annual angler limit
   - vessel trip limit
   - super-exclusive registration
   - sport catcher vessel only area
   - sportfish reserve
   - rod permit
   - bag limits

4. Establish area-wide moratorium (2C or 3A) on charterboat permits, based on the following participation criteria:

   Years of participation
   Option 1: 1995, 1996, and 1997 IPHC licenses and 1998 logbook
   Option 2: 2 of 3 years (1995-97), plus 1998 logbook
   Option 3: 1 of 3 (1995-97), plus 1998 logbook
   Option 4: license or logbook in any one year (1995-98)

5. Publish the GHLs in the Federal Register and require NMFS to notify the Council when a GHL is reached.

5.5.5 Reasoning for, and focus of, an IRFA

To ensure a broad consideration of impacts and alternatives, this draft IRFA has been prepared pursuant to 5 USC 603, without first making the threshold determination of whether or not the proposed actions would have a significant economic impact on a substantial number of small entities. This section attempts to provide information to differentiate among the proposed alternatives, in the context of the requirements to prepare an IRFA. A formal IRFA focusing on the preferred alternative is included in this package for Secretarial review. In determining the scope, or 'universe', of the entities to be considered in an IRFA, NMFS generally includes only those entities, both large and small, that can reasonably be expected to be directly affected by the proposed action. If the effects of the rule fall primarily on a distinct segment, or portion thereof, of the industry (e.g., user group, gear type, geographic area), that segment would be considered the universe for the purpose of this analysis.

5.5.6 Requirement to Prepare an IRFA

The RFA first enacted in 1980 was designed to place the burden on the government to review all regulations to ensure that, while accomplishing their intended purposes, they do not unduly inhibit the ability of small entities to compete. The RFA recognizes that the size of a business, unit of government, or nonprofit organization frequently has a bearing on its ability to comply with a federal regulation. Major goals of the RFA are: (1) to increase agency awareness and understanding of the impact of their regulations on small business, (2) to require that agencies communicate and explain their findings to the public, and (3) to encourage agencies to use flexibility and to provide regulatory relief to small entities. The RFA emphasizes predicting (negative) impacts on small entities as a group distinct from other entities and on the consideration of alternatives that may minimize the impacts while still achieving the stated objective of the action.

5.5.7 What is a Small Entity?

The RFA recognizes and defines three kinds of small entities: (1) small businesses, (2) small non-profit organizations, and (3) and small government jurisdictions.

Small businesses. Section 601(3) of the RFA defines a 'small business' as having the same meaning as 'small business concern' which is defined under Section 3 of the Small Business Act. 'Small business' or 'small business concern' includes any firm that is independently owned and operated and not dominate in its field of operation. The SBA has further defined a "small business concern" as one "organized for profit, with a place of business located in the United States, and which operates primarily within the United States or which makes a significant contribution to the U.S. economy through payment of taxes or use of American products, materials or labor...A small business concern may be in the legal form of an individual proprietorship, partnership, limited liability company, corporation, joint venture, association, trust or cooperative, except that where the form is a joint venture there can be no more than 49 percent participation by foreign business entities in the joint venture."

The SBA has established size criteria for all major industry sectors in the U.S. including fish harvesting and fish processing businesses. A business involved in fish harvesting is a small business if it is independently owned and operated and not dominant in its field of operation (including its affiliates) and if it has combined annual receipts not in excess of $ 3 million for all its affiliated operations worldwide. A seafood processor is a small business if it is independently owned and operated, not dominant in its field of operation, and employs 500 or fewer persons on a full-time, part-time, temporary, or other basis, at all its affiliated operations worldwide. A business involved in both the harvesting and processing of seafood products is a small business if it meets the $3 million criterion for fish harvesting operations. A wholesale business servicing the fishing industry is a small businesses if it employs 100 or fewer persons on a full-time, part-time, temporary, or other basis, at all its affiliated operations worldwide. Finally, for marinas and charter/party boats, a small business is one with annual receipts not in excess of $5.0 million.

The SBA has established "principles of affiliation" to determine whether a business concern is "independently owned and operated." In general, business concerns are affiliates of each other when one concern controls or has the power to control the other, or a third party controls or has the power to control both. The SBA considers factors such as ownership, management, previous relationships with or ties to another concern, and contractual relationships, in determining whether affiliation exists. Individuals or firms that have identical or substantially identical business or economic interests, such as family members, persons with common investments, or firms that are economically dependent through contractual or other relationships, are treated as one party with such interests aggregated when measuring the size of the concern in question. The SBA counts the receipts or employees of the concern whose size is at issue and those of all its domestic and foreign affiliates, regardless of whether the affiliates are organized for profit, in determining the concern's size. However, business concerns owned and controlled by Indian Tribes, Alaska Regional or Village Corporations organized pursuant to the Alaska Native Claims Settlement Act (43 U.S.C. 1601), Native Hawaiian Organizations, or Community Development Corporations authorized by 42 U.S.C. 9805 are not considered affiliates of such entities, or with other concerns owned by these entities solely because of their common ownership.

Affiliation may be based on stock ownership when (1) A person is an affiliate of a concern if the person owns or controls, or has the power to control 50% or more of its voting stock, or a block of stock which affords control because it is large compared to other outstanding blocks of stock, or (2) If two or more persons each owns, controls or has the power to control less than 50% of the voting stock of a concern, with minority holdings that are equal or approximately equal in size, but the aggregate of these minority holdings is large as compared with any other stock holding, each such person is presumed to be an affiliate of the concern.

Affiliation may be based on common management or joint venture arrangements. Affiliation arises where one or more officers, directors or general partners controls the board of directors and/or the management of another concern. Parties to a joint venture also may be affiliates. A contractor and subcontractor are treated as joint venturers if the ostensible subcontractor will perform primary and vital requirements of a contract or if the prime contractor is unusually reliant upon the ostensible subcontractor. All requirements of the contract are considered in reviewing such relationship, including contract management, technical responsibilities, and the percentage of subcontracted work.

Small organizations. The RFA defines "small organizations" as any nonprofit enterprise that is independently owned and operated and is not dominant in its field.

Small governmental jurisdictions. The RFA defines small governmental jurisdictions as governments of cities, counties, towns, townships, villages, school districts, or special districts with populations of fewer than 50,000.

5.5.8 Description of the Businesses Potentially Affected by the Proposed Action(s)

5.5.8.1 Charter fishery

Chapter 3 of this document, the associated appendices, and particularly the 1997 EA/RIR/IRFA (NPFMC 1997) provide as detailed a description of the guided halibut sport fishery (charterboat fleet) as is available. The numbers of businesses in the 2C and 3A fisheries were 397 and 434, respectively, according to 1999 ADF&G logbook data. The 1998 logbook program indicated a similar number of active participants. Actual vessel numbers are slightly higher as some businesses own multiple vessels, so the total number of potentially affected vessels is around 1,100, again based on participation as evidenced by the 1998 and 1999 logbook program. Note that not all of these vessels would qualify under most of the moratorium alternatives, while more than twice that number might qualify under the most liberal alternative (see Section 4.5 through 4.5.7). All would be considered small entities according to the $5 million gross revenue threshold. The charter fleet is a very homogeneous group with similar operating characteristics and vessel sizes, with the exception of a very few larger, 'headboat' style vessels. The vast majority are from 25ft-50 ft in length and carry up to six fishermen each. Chapters 3 and 4 contain more detailed breakdowns on these vessels, by size, homeport, operating characteristics and economic information. This sector constitutes the "universe" of potentially directly regulated entities, for purposes of the RFA assessment.

5.5.8.2 Commercial fishery

Other small entities which may be indirectly affected, but which are not directly regulated by the proposed alternatives, include vessels participating in the commercial halibut fisheries. While these operations are not formally the subject of this IRFA (because they do not face the potential to be directly regulated under the proposed action) they are, nonetheless, included here for completeness, because of the competitive relationship between this sector and the charterboat sector, in terms of the halibut allocation (e.g., GHL) issue. The GHL alternatives essentially represent a trade-off in benefits between the charter and commercial sectors. Baseline data on the number of participants in the commercial halibut fishery are also presented in Chapter 3, for perspective. Projected impacts to these vessels are detailed in Chapter 4, to provide context within which to understand the dynamics of the aggregate halibut fishing industry. The vast majority of the vessels operating in the commercial halibut fishery would be considered small entities. However, a few of the participants will likely meet the $3 million gross revenue threshold and be considered large entities under the RFA. Data, concerning ownership and affiliation arrangements among the vessels in this fleet, are exceeding limited. It is, therefore, impossible to provide precise counts of which of these commercial halibut operations are "small" (under the RFA criterion), and which are not.

5.5.8.3 Other small entities

None of the proposed GHL actions directly regulate "small government jurisdictions" (as that term is defined under RFA). They may, nonetheless, have indirect effects which are important to characterize and understand. These effects are the subject of much of the I/O analysis, contained in Section 4.4.4 of the RIR. For completeness, the following section is included in this IRFA.

Many of the small government jurisdictions indirectly affected by the GHL are considered small entities. The commercial and charter fisheries all occur in communities that have fewer than 50,000 residents. However, some of the participants in these fisheries reside in communities that would not meet the small government jurisdiction definition of the RFA. Table 5.1 shows the gross revenues that were generated from commercial halibut landings that were made in those ports over the years 1995 through 1999. The cities with an asterisk by their name were thought to have populations of more than 50,000 people, and would be considered a large government jurisdiction under the RFA.

There are no "small nonprofit" organizations directly regulated by the proposed GHL action, nor would there be expected to be any significant indirect effect imposed on such entities by this action.

5.5.9 Record keeping requirements

Additional record keeping and reporting measures could be implemented in conjunction with some of the alternatives such as a moratorium or cap on the charter halibut harvest. In and of itself, the proposed record keeping and reporting requirements would not likely represent a 'significant' economic burden on the small entities operating in this fishery. Existing reporting requirements through the State of Alaska would likely negate additional requirements relative to the GHL alternatives, while a moratorium alternative would likely impose additional requirements (initially) for the charter fleet. If NMFS were to implement a separate data collection program, that could increase reporting burdens on individual operators. However, this data collection program is not part of this proposed action. Any additional data collection programs would be implemented at a later time and would be likely to address the needs of other programs (i.e., the halibut charter IFQ Program). Although NMFS has not yet developed a data collection program, it may be similar to the logbook program that was used by the State, and may not represent a significant change from data collection methods for the guided recreational fishery used in the past.

5.5.10 Potential Impacts of the Alternatives on Small Entities

5.5.10.1 Limit the amount of halibut taken by the guided halibut fishery

As discussed previously in this document, this alternative, which would impose a cap on the amount of halibut which could be taken by the charter industry, has the potential to curtail the fishing seasons for all such operators statewide, or in specific regions for which a cap may be imposed, *only* if implemented as a strict allocation, which is contrary to the Council's intent under the GHL as recommended in 1997. The magnitude, timing, and distribution of the associated operational effects vary across the options under consideration, but many have the potential to result in adverse economic impacts to the small charter operators, lodges, and outfitters across Alaska. These economic and operational effects are the subject of (and reported in detail in) the RIR. An enumeration and description of the potentially effected universe of entities is contained in Section 3.2.1.2 of the EA, and Section 4.6.1 of the RIR.

Conversely, not imposing a cap on the charter fleet could erode the harvest share available to commercial halibut fishermen, most of whom are also small entities, based upon RFA criteria, although none of whom would be "directly regulated" by the proposed action. Alternatives which specify the GHL as a target amount

for the charter fleet (and then impose restrictive harvest measures on that sector in subsequent years) would not curtail the fishery, but could impact client demand for fishing trips, depending on the follow-up measures implemented. For example, reduced bag limits for the charter fleet could induce clients to take fewer trips, thereby reducing revenues to individual operators in the charter fleet. Based on projections of growth of the charter fleet, and current halibut biomass conditions, a GHL could be met in the near future, depending on the level at which the GHL is set, thereby triggering harvest or effort reduction measures.

Table 5.1 Summary of ex-vessel revenues from the commercial halibut fishery, 1995-99.

Sum of Gross Earnings		Year					
State	Port	95	96	97	98	99	Grand Total
AK	ANCHOR POINT				1,139		1,139
	ANCHORAGE*		6,725	25,016	70,132		101,873
	ANGOON	111,697	87,509	82,633	27,823	38,051	347,715
	BARANOF WARM SPRINGS		27,601	11,032			38,633
	CHIGNIK				4,973		4,973
	CORDOVA	1,781,749	2,001,284	2,825,906	1,471,107	2,740,079	10,820,126
	CRAIG	668,746	991,971	1,090,759	607,849	738,572	4,097,897
	DUTCH HBR/UNALASKA	2,968	54,233	9,264	33,164	1,777	101,406
	EDNA BAY	27,325	23,843	29,300			80,467
	ELFIN COVE	178,734	89,482	80,406	8,380		357,001
	EXCURSION INLET	318,595	153,501	75,798	5,395		553,289
	GIRDWOOD			1,874			1,874
	GUSTAVUS	116,623	157,019	110,859	95,256	108,042	587,799
	HAINES	66,512	79,956	190,086	1,083,555	1,109,594	2,529,703
	HOLLIS		45		370		415
	HOMER	5,688,487	7,631,857	8,714,397	7,770,941	9,929,417	39,735,100
	HOONAH	1,826,650	2,764,716	3,846,839	1,829,889	2,535,715	12,803,809
	HYDER	3,187	4,107	4,862	2,304	3,431	17,891
	JUNEAU	898,906	2,062,209	3,436,267	2,343,456	5,515,122	14,255,961
	KAKE	756,395	920,960	926,616	157,730	5,309	2,767,010
	KASILOF	13,284	6,333		2,020		21,637
	KENAI	508,771	679,510	466,951	311,420	324,309	2,290,962
	KETCHIKAN	854,249	1,035,566	1,283,148	734,028	1,065,841	4,972,831
	KING COVE	161,359	192,190			887	354,436
	KLAWOCK	64,684					64,684
	KODIAK	12,200,925	12,440,337	15,418,179	6,620,864	10,250,287	56,930,591
	METLAKATLA	109,019	95,056	89,560	23,011	39,408	356,054
	NIKISKI	52,917	31,598		128		84,642
	NINILCHIK	138,510	135,089	260,645	291,816	168,790	994,850
	OLD HARBOR		1,977	157	126		2,261
	PELICAN	1,712,383	1,564,205	1,087,903	17,161	263,422	4,645,074
	PETERSBURG	4,722,819	5,900,427	5,515,923	3,403,740	4,305,313	23,848,222
	PORT ALEXANDER	140,076	155,265	205,191	84,768	183,582	768,881
	PORT GRAHAM			83,605			83,605
	PORT ORCHARD					3,139	3,139
	PORT PROTECTION			386			386
	PORTAGE BAY		496				496
	SAND POINT	36,140	17,629		10,105		63,874
	SELDOVIA	4,352	2,264	2,503	2,999	4,319	16,437
	SEWARD	4,817,417	5,602,397	7,642,425	4,787,574	9,437,764	32,287,577
	SITKA	5,695,570	6,268,762	7,477,034	4,299,169	5,103,066	28,843,601
	SKAGWAY	8,134	7,266	11,170	44,991	49,106	120,667
	TENAKEE SPRINGS	987	3,393	388	2,442		7,209
	THORNE BAY	6,552					6,552
	VALDEZ	254,806	160,931	186,850	113,374	217,339	933,300
	WHITTIER	207,930	497,874	607,453	384,664	695,786	2,393,708
	WRANGELL	955,340	1,821,100	2,190,121	1,075,514	2,238,512	8,280,586
	YAKUTAT	1,277,324	1,281,872	2,608,225	1,250,095	2,472,949	8,890,465
AK Total		46,390,120	54,958,553	66,599,733	38,973,473	59,548,926	266,470,805
OR	ASTORIA*	17,507	120,631	109,633	36,745	3,046	287,561
	NEWPORT*		47,028				47,028
	WARRENTON	596,402	219,434	207,683		47,844	1,071,363
OR Total		613,908	387,092	317,316	36,745	50,890	1,405,951
WA	ANACORTES*	50,755	24,646	14,027			89,428
	BELLEVUE*	6,325				58,385	64,710
	BELLINGHAM*	2,706,728	3,823,612	4,127,742	3,063,708	2,806,984	16,528,774
	EDMONDS	101,802					101,802
	LA CONNER	137,274	96,505	93,344	53,620	13,266	394,009
	PORT ORCHARD	1,368	9,364		7,613	405	18,749
	PORT TOWNSEND	11,261					11,261
	SEATTLE*	1,124,740	1,869,636	1,461,727	462,540	441,402	5,360,045
	STANWOOD			15,650			15,650
WA Total		4,140,253	5,823,763	5,891,412	3,587,481	3,561,856	23,004,765
Grand Total		51,144,281	61,169,409	72,808,461	42,597,699	63,161,672	290,881,521

Actions which set the GHL as a range of halibut (a floor in either numbers of fish or pounds), as opposed to a percentage of the available quota, are less likely to negatively impact the charter fleet in general; conversely, these alternatives result in potential negative impacts to the commercial fishery (relative to a floating percentage for the charter fleet) particularly if halibut biomass declines to low levels in the future (an outcome which fails to achieve the objective of the proposed action).

As noted previously, it is not possible, based upon available data, to provide quantitative empirical measures of the precise scope or nature of attributable economic impacts which may accrue from adoption of this aspect of the action. All such impacts have been addressed, both quantitatively and qualitatively, to the fullest extent practicable, throughout the preceding RIR. Nonetheless, it is possible to conclude that, because all potentially effected entities are "small", as this term is defined under the RFA , and there are no meaningful distinctions to be made "among" the population of small charter operations, based upon size or operational characteristics (i.e., the population of small entities cannot be usefully further subdivided), there would be no differential impacts, based upon size of operation, across the charterboat sector, attributable to this aspect of the proposed action.

5.5.10.2 Impose a moratorium on further entry into the guided halibut sport fishery

The alternative to impose a vessel moratorium would not, in and of itself, result in significant adverse impacts to the charterboats currently involved in the fishery, unless the number of qualifying vessels was sufficiently low as to negate the need for additional management measures (i.e., if the number of vessels qualifying would not be expected to be able to reach the GHL). As the RIR demonstrates (see Section 4.5), given the potential GHL alternatives, halibut biomass condition (currently at all-time highs and expected to decrease), and the current and expected charter harvest overall, it is not likely that a moratorium alternative would be effective, by itself, in keeping harvest within the GHL in the near future (i.e., a moratorium would fail to achieve the management objectives specified for this action and, therefore, is not a viable "alternative", but rather a potential "complement", to a GHL program).

A moratorium could provide a more stable operating environment for those who qualify in the charter fleet. The only adverse impact of a moratorium would be the loss of income by businesses which do not qualify for such a moratorium. The RIR analysis from Chapter 4 shows a substantial number of vessels (businesses) operating in 1998 and 1999 that may not qualify under any but the most liberal moratorium alternative, and there is considerable entry and exit in this sector in recent years.

Local area management plans (LAMPs), being developed separately from the measures proposed in this analysis, are an alternative forum for moratorium programs. Local level moratoria may be able to address overcrowding problems and local industry stability, while minimizing negative impacts resulting from displaced charter operators, or from newly developing areas (see Section 4.5.4).

It is not possible to be more specific about potential impacts associated with this proposed action. The analysis, presented in the RIR, treats this issue in as much detail as can be provided, given the available data. Again, all entities which may be directly regulated under the proposed action, would be "small", based upon RFA definitions. Therefore, there are no differential effects, based upon variable size of operation, associated with this aspect of the action under consideration, herein.

5.5.10.3 Publish the GHL and require notification to the Council when a GHL is reached

This alternative would result in no impacts on small entities, similar to the no action alternative. No implementing regulations changing the amount of halibut harvested by any sector would result. No changes to fishing practices would result under this alternative. This alternative would merely establish a notification

process whereby NMFS would notify the Council and the public if a GHL is exceeded. This could result in additional recommendations for additional rulemaking, but such rulemaking is not required by this notification.

Conclusion

There are no alternatives to the Council preferred alternative which simultaneously achieved the objectives of the proposed action and impose smaller economic and operational burdens on directly regulated small entities, as demonstrated by the analysis contained in Chapter 4 of this document. However, recent case law resulted in the identification of a new preferred alternative that would set the GHLs and methodology for reducing them if the halibut biomass declines, and require NMFS to notify the Council once a GHL is reached. Implementing management measures that would reduce guided sport halibut harvests would result under a separate, future action.

Data are insufficient to permit preparation of a "factual basis" upon which to certify that the Council preferred alternative does not have the potential to result in a "significant adverse impacts on a substantial number of small entities", as those terms are defined under RFA. Because, based on all available information, it is not possible to certify this outcome if the proposed action is adopted, a formal IRFA, focusing on the preferred alternative(s), has been prepared and is included in this package for Secretarial review. However, it appears evident that the NMFS preferred alternative, which by itself only triggers notification to the Council that a GHL has been reached under the standard Federal rulemaking process, does not directly impact any small entity. A formal FRFA has been prepared for the NMFS preferred alternative (dated April 2003).

6.0 References

Ben-Akiva, Moshe and Steven R. Lerman. 1987. Discrete choice analysis: Theory and applications to travel demand (The MIT Press, Cambridge, Massachusetts), Chapter 6.

Boardman, A.E., D.H. Greenberg, A.R. Vining, and D.L. Weimer. 1996. *Cost-Benefit Analysis: Concepts and Practice.* Upper Saddle River, N.J.: Prentice Hall.

Butler, J.S. and Robert Moffitt, 1982, A computationally efficient quadrature procedure for the one-factor multinomial profit model, Econometrica 50, 761-765.

Chamberlain, G., 1982, Analysis of covariance with qualitative data, Review of Economic Studies 47, 225-238.

Clark and Parma. 1998. Assessment of the Pacific halibut stock in 1998. In: IPHC Report of Assessment and Research Activities 1998. IPHC, P. O. Box 95009, Seattle, WA 98145-2009. 348 pp.

CFEC. 1999. Changes Under Alaska's Halibut IFQ Program, 1995-98. Commercial Fisheries Entry Commission, 8800-109 Glacier Highway, Juneau, Alaska, 99801. Draft Research Report.

Criddle, K. R. 1993. *A Bioeconomic Analysis of the Pacific Halibut Industry.* Proceedings of the Fourth International Symposium of the Conference of Asian and Pan-Pacific University Presidents, Anchorage, Alaska.

Dillman, D. A., 1978. Mail and telephone surveys (John Wiley & Sons, New York).

Edwards, S. F., 1990. An Economics Guide to Allocation of Fish Stocks between Commercial and Recreational Fisheries. NOAA Technical Report NMFS 94.

Frenette, B. and P. Suchanek. 1998. Summary Data from the Sport Fishery for Pacific Halibut in the IPHC Area 2C Portion of Southeast Alaska, 1998. Alaska Department of Fish and Game, Division of Sport Fish,P.O. Box 240020,Douglas, AK 99824-0020. 31 pp.

Geier, H., D. Holland, and E. Schuster. 1994. *Using IMPLAN to Analyze Small County Economies for Identification of Development Opportunities.* United States Department of Agriculture Forest Service Intermountain Research Station Research Paper.

Gilroy, H. 1999. The Pacific halibut fishery, 1998. In: 1999 IPHC Annual Meeting Handout. IPHC, P. O. Box 95009, Seattle, WA 98145-2009. 94 pp.

_____. 1998. 1998 commercial fishery and regulation changes. In: IPHC Report of Assessment and Research Activities 1998. IPHC, P. O. Box 95009, Seattle, WA 98145-2009. 348 pp.

Green, William H., 1998, Limdep, Version 7.0 (Econometric Software, Inc., Plainview, New York).

_____. 1997, Econometric analysis, Third edition (Prentice Hall, Upper Saddle River, New Jersey).

Guilkey, David K. and James L. Murphy, 1993, Estimation and testing in the random effects profit model, Journal of Econometrics 59, 301-317.

Herrmann, M., S.T. Lee, C. Hamel, K. Criddle, H. Geier, J. Greenberg, C. Lewis. 1999. *An Economic Assessment of the Marine Sport Fisheries in Lower Cook Inlet*. Proceedings of the seventh Minerals Management Service information transfer meeting. OCS Study MMS 99-022, January 1999.

Herrmann, M. 1999. Relationship Between Ex-vessel Revenue and Halibut Quota: Some Observations. Manuscript prepared for the North Pacific Fishery Management Council, 605 West Fourth Avenue, Suite 306, Anchorage, Alaska. November 9, 1999. 35pp.

Herrmann, M. 1996. *Estimating the Induced Price Increase for Canadian Pacific Halibut with the Introduction of the Individual Vessel Quota Program.* Canadian Journal of Agricultural Economics. 44: 151-164.

Hill, P. S., DeMaster, D. P., and Small, R. J. 1997. "Alaska Marine Mammal Stock Assessments, 1996." in *NOAA Technical Memorandum NMFS-AFSC-78* National Marine Fisheries Service, National Marine Mammal Laboratory, 7600 Sand Point Way NE, Seattle, WA 98115. 154 p.

Howe, A. L., G. Fidler, C. Olnes, A. E. Bingham, and M. J. Mills. 1998. Harvest, catch, and participation in Alaska sport fisheries during 1997. Alaska Department of Fish and Game, Fishery Data Series No. 98-25, Anchorage.

Homans, F. R. 1993. *Modeling Regulated Open Access Resource Use*. Doctoral Dissertation. University of California at Davis.

Howe, A. L., G. Fidler, C. Olnes, A. E. Bingham, and M. J. Mills. 1998. *Harvest, Catch, and Participation in Alaska Sport Fisheries During 1997.* Alaska Department of Fish and Game, Fishery Data Series No. 98-25, Anchorage.

Institute for Social and Economic Research (ISER). 1999. Economics of Sport Fishing in Alaska. Prepared for Alaska Department of Fish and Game. Anchorage, Alaska.

International Pacific Halibut Commission. 1998. The Pacific halibut: Biology, fishery and management. Int. Pac. Halibut Comm. Tech. Rep. 40. 64 p.

Jennings, S. and M. J. Kaiser. 1998. The effects of fishing on Marine Ecosystems. Advances in Marine Biology 34:201-352.

Jensen Consulting. 1997. *North Pacific Fishery Management Council Recreational Economic Impact Model.* Reference manual for version 3.0.

Johnston, R. J., J. G. Sutinen. *Appropriate and Inappropriate Economic Analysis for Allocation Decisions* 1999. Report to the Halibut Coalition, Juneau, Alaska. October.

Jones & Stokes Associates, Inc. 1987. Southcentral Alaska Sport Fising Economic Study. Prepared for Alaska Department of Fish and Game, Sport Fish Division. Sacramento, California.

_____. 1991. Southeast Alaska Sport Fishing Economic Study. Prepared for Alaska Deparment of Fish and Game, Sport Fish Division. Sacramento, California.

Jolly, C.M. and H.A. Clonts. 1993. *Economics of Aquaculture.* New York: Haworth Press.

Knapp, G. 1997a. *Modeling Community Economic Impacts of the Alaska Halibut IFQ Program.* Final project report on Saltonstall Kennedy Program award #NA37FD0184. Institute of Social and Economic Research, University of Alaska, Anchorage.

_____. 1997b. *Alaska Halibut markets and the Alaska halibut IFQ Program.* 1999. Project report on Saltonstall Kennedy Program award #NA37FD0184. Institute of Social and Economic Research, University of Alaska, Anchorage. January 1999. January, 1997. 54 pp.

Krinsky, A.L. Robb, 1986, On approximating the statistical properties of elasticities, Review of Economics and Statistics 9, 715-719.

Lee, S.T., M. Herrmann, I. Wedin, K. R. Criddle, C. Hamel, and J. Greenberg. 1999a. *Summary of Angler Survey: Saltwater Sport Fishing off the Kenai Peninsula, Alaska.* Final report, Alaska Sea Grant Project 98-403 R14-17. University of Alaska Fairbanks. April.

_____., M. Herrmann, K. Criddle, and Charles Hamel. 1999b. *The Effect of Fishery Attributes on Participation Rates: the Kenai Peninsula Marine Sport Fishery* . Working Paper. November.

Lin, B. H., H. S. Richards, and J. M. Terry. 1988. An Analysis of the Ex-vessel Demand for Pacific Halibut. Marine Resource Economics. 4: 305-314.

Livingston, P. A., and Goiney, B. J. 1983. "Food habits literature of North Pacific marine fishes: A review and selected bibliography." in *NOAA Technical Memorandum NMFS F/NWC-54* U.S. Department of Commerce, NOAA. 81 p.

Maddalla, G. S., 1987, Limited dependent variable models using panel data, The Journal of Human Resources 22, 307-338.

NMFS. 1999. Environmental Assessment/Regulatory Impact Review for an Emergency Rule to Implement Reasonable and Prudent Steller Sea Lion Protection Measures in the Pollock Fisheries of the Bering Sea and Aleutian Islands Area and the Gulf of Alaska (January 1999, FONSI signed January 14, 1999.) Available from NMFS, Alaska Regional Office, P.O. Box 21668, Juneau, AK 99801. 89 pg.

_____. 1998a. Final Supplemental Environmental Impact Statement: Groundfish Total Allowable Catch Specifications and Prohibited Species Catch Limits Under the Authority of the Fishery Management Plans for the Groundfish Fishery of the Bering Sea and Aleutian Islands Area and Groundfish of the Gulf of Alaska. December 1998. National Marine Fisheries Service, P.O. Box 21668, Juneau, Alaska 99802. 692 pp + Appendices and Comments.

_____. 1998b. Environmental Assessment for 1999 Groundfish Total Allowable Catch Specifications Implemented under the Authority of the Fishery Management Plans for the Groundfish Fishery of the Bering Sea and Aleutian Islands Area and Groundfish Fishery of the Gulf of Alaska Area. (December 24, 1998, FONSI signed December 24, 1998.) Available from NMFS Alaska Regional Office, P.O. Box 21668, Juneau, AK 99801. 45 pg.

_____. 1998a. "Stock Assessment and Fishery Evaluation Report of the Gulf of Alaska as Projected for 1999." Compiled by the Plan Team for the Groundfish Fisheries of the Gulf of Alaska, North Pacific Fishery Management Council, 605 West 4th Avenue, Suite 306, Anchorage, AK 99501.

_____. 1998b. "Stock Assessment and Fishery Evaluation Report for the Groundfish Resources of the Bering Sea/Aleutian Islands Region as Projected for 1999." Compiled by the Plan Team for the Groundfish Fisheries of the Gulf of Alaska, North Pacific Fishery Management Council, 605 West 4th Avenue, Suite 306, Anchorage, AK 99501.

North Pacific Fishery Management Council (NPFMC). 1997. Draft Environmental Assessment / Regulatory Impact Review / Initial Regulatory Flexibility Analysis for Proposed Regulatory Amendments to Implement Management Alternatives for the Guided Sport Fishery for halibut off Alaska. North Pacific Fishery Management Council, Anchorage.

_____. 1998. Draft Environmental Assessment / Regulatory Impact Review / Initial Regulatory Flexibility Analysis for Proposed Regulatory Amendments to Define Subsistence off Alaska. North Pacific Fishery Management Council, Anchorage.

Pautzke, C. G. and C.W. Oliver. 1997. Development of the Individual Fishing Quota Program for Sablefish and Halibut Longline Fisheries off Alaska. North Pacific Fishery Management Council, 605 West Fourth Avenue, Suite 306, Anchorage, Alaska. X pp.

Quinn, T. J. II, E. A. Best, L. Bijsterveld, I. R. McGregor. 1983. Sampling Pacific halibut (*Hippoglossus stenolepis*) landings for age composition: history, evaluation, and estimation. International Halibut Commission, Scientific Report No. 68, Seattle, Washington.

SAS/QC(R) Software:P Usage and Reference, 1995, Version 6, Fist Edition, Volume 1 (SAS Institute Inc., Cary, NC), Part 6.

Schellberg, T. 1993. *The Problem of Nonmalleable Capital Revisited: A study of the Pacific Halibut Fishery.* Natural Resource Modeling. 7(3): 245-277.

Smith, P. 1999 report to the IFQ fleet. 1999. NMFS, Juneau, Alaska. 36 pp.

Sullivan, P., A.M. Parma, and W.G. Clark. In press. Pacific halibut assessment: data and methods. IPHC Scientific Report. IPHC, P. O. Box 95009, Seattle, WA 98145-2009.

Steinback, S.R. 1999. *Regional Economic Impact Assessments of Recreational Fisheries: An Application of the IMPLAN Modeling System to Marine Party and Charter Boat Fishing in Maine.* North American Journal of Fisheries Management (August).

Thunberg, E., S. Steinback, G. Gray, A. Gautam, M. Osborn, 1999, Volume III: Summary report of methods and descriptive statistics for the 1994 Northeast Region marine recreational fishing participation survey, NOAA Technical Memorandum NMFS-F/SPO-39.

Tomek, W.G. and K.L. Robinson. 1972. *Agricultural Product Prices*. Ithaca: Cornell University Press.

Trumble, R. 1993. Allocation of Pacific Halibut Among Sport and Commercial Fisheries--Has the Time Come? IPHC, P. O. Box 95009, Seattle, WA 98145-2009.

Vincent-Lang, D. and S. Meyer. 1993. Projections of the growth of recreational halibut fisheries off Alaska. A report for the North Pacific Fishery Management Council. NPFMC, 605 W. 4th Avenue, Suite 306, Anchorage, Alaska 99501. 14 pp

Williams, G. 1999. Appendix A. Pacific halibut stock assessment and fishery evaluation. In: Stock Assessment and Fishery Evaluation Report for the Gulf of Alaska Groundfish Total Allowable Catch Specifications. 680 p. Available from NPFMC, 605 W. 4th Avenue, Suite 306, Anchorage, AK 99501.

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